

**R/C SCALE: AL WILLIAMS GRUMMAN GULFHAWK**

**RADIO CONTROL**

APRIL / 1966 / 50¢

# **MODELER**

**THE LEADING MAGAZINE FOR RADIO CONTROL**



## **THE PIPSQUEAK**

BY DAVE ROBELEN

## **WOLFMEISTER LR-3**

BY DON DEWEY

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# RADIO CONTROL MODELER

APRIL 1966

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## The Cover

20-year-old Charleen Jones, Miss Westminster of 1962, holds Rolph McPherson's radio controlled scale model of the Wolf Hirth LO-100. 80" wingspan with CAR on tow line or slope. Dimensions on other model not available! Ektachrome by Dale Willoughby.

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# EDITOR'S MEMO

by Don Dewey



**G**REETINGS to all you fraternal brothers of the Order of Toy Airplane Drivers.

This has been a busy month on the West Coast. The first M.A.T.S. (Model Airplane Trade Show), sponsored by the hard-working Garden Grove R/C Club is now history, and shows great potential for many years of successful repeat performances. Held in the background of the unusual and interesting Movieland Of The Air Museum, the show hosted representatives from most of the nation's leading manufacturers of R/C products, as well as members of the model aviation press. Many new items of interest to RC'ers were on display for the first time—items destined to become popular favorites in the months to come. You'll find a complete pictorial coverage of this first MATS show in this issue of RCM. Along with it go our congratulations to Dick Barnhard and the entire Garden Grove R/C Club for their untiring efforts to present a show of this magnitude on the West Coast.

During the days of the MATS show, covered by RCM's Chuck Waas, yours truly was embroiled in the process of laying out the RCM Annual along with this monthly issue. We did, however, have the honor of being visited by several of our long-time friends who were attending the show—Dr. Bob Lien of Custom R/C Products, Jack Blything of Woodcraft, Bill Welker of CitizenShip, and our own Contributing Tech Editor from Arizona, Ed Thompson, who was assisting John Maloney at the World Engines booth. While Bill Welker and Ed Thompson were here, the pair, plus Bill O'Brien and myself decided to outdo Ken Willard by one point. Since Ken habitually flies his models from the street in front of his house, we decided to fly a Galloping Ghost ship from my roof. Since none of us had flown Galloping Ghost before, we took the Pip-squeak model, featured in this issue, and proceeded to climb up on the roof while Sally fired the Polaroid camera. After an afternoon's session of flying pylon around the telephone poles, tree tops, and TV antennas, we decided we had set some form of record which had to be reported immediately to the Chief Sunday Flier. This was immediately accomplished, and the last that we

heard, that intrepid pilot of diminutive R/C aircraft (like that phrase?), Ken Willard, was strapped to the top of a telephone pole with a lineman's belt, busily nailing a one foot square ply platform to the top of said pole. It seems he just won't be outdone. . . .

By the way—we promised Bill Welker that we wouldn't let Vern McNabb (his boss) at CitizenShip know that he was up here flying off the roof when he should have been demonstrating the new CitizenShip digital proportional system. Bill was in the doghouse, anyway, for crashing a brand new ship that was given to Vern, so don't say anything. . . .

Here's a letter that just has to be passed on to you. It's from Bob Bailey in Lansing, Michigan:

Dear Don:

*Just got time to catch up on "digesting" the January issue of RCM, and I nearly cracked up when I read Chuck Cunningham's account of a local canine using his transmitter as a fireplug. I had the dubious pleasure of having this happen to me about 10 years ago. I say "pleasure," because in my particular case, the dog never saw fit to return after his bout with my transmitter!*

*Our flying field back in 1955 was in a section of farm country just outside a small village called Holt, Michigan. The place was rather sparsely populated, but one of the local residents who lived about a quarter mile from the field, had the biggest German Shepherd I've ever seen. About nine times out of ten, the roar of an airplane would bring forth this furry monster.*

*I recall that he had put his foot through a couple of the guy's wings a week or two previous to the incident I'm about to relate, and needless to say, they had seriously considered bringing their shotgun to the next flying session. This proved unnecessary, however, for the crowning touch, and the end forever of our furry visitor, came about two weeks later.*

*I had just purchased a new Gyro Electronics "Mac II" transmitter—the 15 pound, ground-based job, with a nine foot whip antenna, and five watts input yet! This old baby would reach halfway across the U. S., and was powered by a Willard BB-54, driving a vi-*

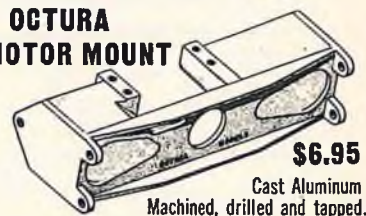
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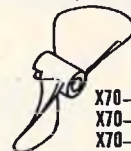
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brator power supply. The latter put out 135V and had the disconcerting habit of giving one a bone-jarring poke when you grounded one finger on the keying jack and another on the switch!

We had been having our usual troubles with old "Rex," the furry one, on this particular day, and had been shooing him away as gently as possible, with sincere hopes that we would not invoke the wrath of his ugly fangs. I had just fired up my Sterling Monocoupe and was busy nursing it into a safe altitude, when I heard several of the guys screaming at the top of their lungs. "Get that . . . dog out of there," somebody exclaimed.

I never saw the sinful act that old "Rex" had committed against my beautiful new transmitter — only the end result, which was a wildly gyrating German Shepherd, screaming, yelping, and inventing some very original aerobatics all his own! A brief glance at the Gyro transmitter told the story. Old Rex had found the combination. In his attempt to substitute my transmitter for a fire-plug, he'd made direct contact with the keying jack and the switch, and the result was inevitable.

When the old fool finally got his nerves calmed down so that they quit twitching and flinging him into the air, he put into high gear and tore off down the road for home. He must have had a good memory, too, because in the four years we flew at that location, he never once ventured forth or showed his face again. Maybe he was just embarrassed at his mistake, but I'm inclined to think he felt it just wasn't worth the misery involved, to come down and harass us anymore.

I would highly recommend to Mr. Cunningham that he have his transmitter case re-anodized. The old Gyro had a steel case, and Cunningham was about right when he said his "transmitter would probably rot away." That dog must have been a corrosive old devil, because it nearly rusted my Gyro into a little lump, and even enamel wouldn't stick to it after that!

Bob Bailey

We'll pass without further comment on Bob's letter . . .

Speaking of Chuck Cunningham — he and the Fort Worth Thunderbirds (of which yours truly is a member, by the way), lost their long-standing flying site. After hearing the details of the how's and why's, I asked Chuck to drop me a note so that I could pass them on to you. Here it is:

"In answer to our phone conversation of today, our statistics are these on the flying site and the people involved. There are about 150 R/C cats in our area . . . about fifty are active. We have been flying at a site near Benbrook Lake, a Corps of Engineers flood con-

trol basin, for about five years. This land is a vast park, leased by the Corps of Engineers to the city of Benbrook, a small town next to Fort Worth. Approval was needed to begin flying from both the city of Benbrook and the CofE. This has been a reasonable set-up until houses were built a quarter mile north of our runway. Since the prevailing wind is from the south, this makes for (supposed) noise and landing patterns in their general direction. At any rate, about fifteen citizens put the skids to a long-standing set-up without too much pressure from us, since most of us live in Fort Worth and can't beef too much with their City Hall. We have a metropolitan area of about 700,000 people, and our main industries are aircraft — General Dynamics, Bell Helicopter, Ling-Temco-Vought, and the like, so we should be an air-oriented community. As a matter of record, the houses in question are right in line with the takeoff pattern from GD and Carswell AFB, and most of the flights out of there are B-58, B-52, etc., and directly over the houses at a low altitude. Yet the models a quarter of a mile away are the culprits! How's that grab 'ya?"

This seemingly ridiculous situation is happening more and more frequently in various parts of the country. And as we try our best to be considerate, to improve muffler performance, etc., we are going to find what we should have known all along — **it's a matter of public education!** And I can't repeat this, or emphasize this strongly enough! An uneducated general public is an un-cooperative public! And this matter of public education is the job of every single R/C club in the country . . . the job of the Academy of Model Aeronautics . . . the job of the model press . . . and most important, **your job as an individual modeler!** Every informative newspaper article, every television program, every bit of information that can be brought before the public enhances our chances of obtaining the necessary recognition for better cooperation on the part of the rest of the community. A living example of this is the County of Los Angeles whose interest in model aviation, and radio control specifically, was brought about by interested and dedicated RC'ers who took their case, backed up by facts and figures, plus actual demonstrations, to County officials and members of the Board of Supervisors. Today, we enjoy authorized R/C flying sites that were constructed by the County, with the aid and cooperation of the modelers, that include such luxuries as paved runways, fenced spectator areas, paved and frequency marked flight pits, paved parking areas, and the like. And all a

(Continued on Page 69)



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# AIR MAIL

LETTERS TO THE EDITOR • RCM, P.O. BOX 487 • SIERRA MADRE, CALIF.



### We missed the point . . .

Sir:

I am writing in reference to the Editor's Memo column in the February issue. In this issue you take "Count Marco" (Jack Brockman) to task for his article in the Fresno Radio Modeler's 'Watt's New.'

I feel that you completely missed the point of this article. I agree with you — keep the ladies in R/C, and give credit to those who deserve it. But this is not the point in question. The problem was that our meetings were distracted by too many wives, girl friends, and children. Side conversations among non-R/C wives and kids was uncontrollable. They weren't interested in R/C and the kids caused their own little problems.

Yes, let's do give credit to those interested in R/C. Count Marco knows we have them (ref: Mrs. Meade Hallock). But I feel (his) article was worth any problems it caused. Now let's look at the results. The December meeting ended the intra-FRM controversy by being the most no-nonsense, most business like, more-accomplished meeting since I joined FRM in 1964. In fairness, this was at least partially due to a new President, and his determination to rule with a hard and fair hand, which he did. Any comments before the meeting about "Where are the girls?" were not heard after the meeting.

You may print any section of this that you see fit. (I doubt that you will.)

Noland Adams

Kerman, California

*I see your point, Noland. If I brought my wife (either R/C nor non-R/C) and my girl friend, and children, the side conversations would be distracting to say the least!*

### . . . Or did we?

Sir:

I am one of the women members that "Count Marco" wrote about. I would like to take this opportunity to set "Mr. Opinionated" straight on a few things. I think that if he feels this way about women and children that attend the meetings, then his place is with his wife at her sewing class. Maybe a little associating with his wife and family and he would realize, and understand, that he isn't married to a model plane.

I was always of the opinion that the Hobby we all enjoy, was also for the whole family, *IF* the wife and children enjoy the same hobby. I happen to be one wife that enjoys my husband's hobby. I enjoy flying as much as he, although I don't get to go out as often.

That doesn't make me enjoy it any the less. It just means that my husband and children come first, *THEN* the hobby.

Personally I'm scared to start an engine, but that doesn't mean that I have to give up my hobby. And if the time ever came that I had to start one — I'm sure that if you learned to start one, I can too. But I'm very lucky to have an understanding husband that starts them for me; and is happy that I am interested enough in him to want to understand and enjoy the same hobby as he does.

Velma Hallock

Fresno, California

### The Loner

Sir:

I would like to express my thanks to the Fraternity of R/C flyers, of which I claim to be a member of out of interest in the hobby, and now, through my ability to fly, for all the help and good fellowship they have shown me. I read in publication each month about what people have to say on the Builder Of The Model Rule, Air Hogs, Young People's Interest, Flying Sites, and now most recently, Wives In the Hobby, and I wonder just where are these people that are doing the complaining? I have met what I feel to be some of the top fliers around the country like Jim Kirkland, Jim Grier, Walt Schoonard, Randy McGee, Curtis Brownlee, and many others, who have gone out of their way to be helpful and give a beginner the help and encouragement needed to keep going. I live about 70 miles from the nearest RC club in Jacksonville, Florida, and that makes it a little difficult to go to meetings and fly with them. I have been over there several times, and Earl Terry, the President, and the club members to the last one have always been ready and willing to help. When they have a fly-in, or sanctioned meet, the wives help out with the food and drink and everyone seems to enjoy themselves. When you get a large group together from all walks of life like we have, you would expect to find a few bad apples in the barrel, but as yet I can't say that I have seen any. It is a wonderful thing to feel that you are a member of this type of team . . . the people who are doing the complaining, and they must be few, should try it alone for three years, as I have, and see how glad they would be to have someone to fly with, even if it was an air hog! Let me say again how appreciative we beginners are of all the help those of you

(Continued on Page 12)



# BACHELOR SPECIALS

The response by bachelors to our clip out ad appealing to wives in December (see photo of ad) was so outstanding, we make the specials in this ad to bachelors only. If you acquire a marriage license before you order items in this ad the offer is void.



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## AIR MAIL

(Continued from Page 10)

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Robert W. Carpenter  
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## Digital Decabulator

Sir:

I have just put the cover on your Digital Decabulator and installed it in my latest bird. Outstanding. Yes, I for one, have noticed all these "Johnny Come Lately's" that modify a thing and then acclaim it as a "technical breakthrough." Yours truly is a breakthrough.

The fact that I started it this morning and already (3 minutes before midnight on New Year's Eve) I have it installed and working attests to your grasp of highly technical machinery and ability to write technical articles. Now, for me, this was a very timely writing as I was looking for a suitable motor driver. The Mox .049 I've installed in Pappy Rebolt's "Glenny" is just too much for most motor drivers. At first, I was stumped for the s-value phenylhydrobenzamine and 5% reminative tetrybiodohexamine in the slipstream mixture. Here in Tripoli, Libya, we are handicapped by the lack of a toy airplane store. But as my wife had a lot of Jello left from Christmas, I found this to work very well. Besides, it tastes good when you're adjusting or changing batteries.

Now—I understand and realize fully that you didn't intend this to be a motor driver. But you will be surprised how easy it was for an advanced beginner (I read all the instructions Pappy wrote on the Glenny plans) to merely change a nut here, a desistor there, in order to make that counter-revolving, nitro-burning Mox diesel really burning right along. Swinging a 12-4, three blader, I have the agility and maneuverability that gentleman, Dr. Brooke, achieved on his latest win.

I can't wait for tomorrow. I'll leave this raging party and with a flashlight strapped to the Glenny, I'll test hop the Digital Decabulator tonight. If interested, I'll let you know how it comes out.

Sgt. J. Duncan, USAF  
Tripoli, Libya

Sarge, ole buddy, you'll love the Auto-Puls system in this issue. And watch those parties . . .

## Half-A Multi

Sir:

I have noticed in the recent issues of your magazine that many modelers are trying to put multi-channel equipment into airplanes powered by 1/2A class engines. This has been my goal since I first got into radio control. For the past two years I have been successfully flying a modified Minnie Mambo (Sterling) design powered by a Cox Golden Bee .049 engine. I replaced the original cylinder with one from a Cox Tee Dee .049 in order to obtain the greater power needed. For the radio, I am using a

(Continued on Page 66)



# CUNNINGHAM ON R/C



**T**HE average age of RCM readers is roughly in the thirty-five year age bracket. This is a group of "beginning to get gray guys" whose memory is pretty good. Just to test that memory, think back to the period movies and remember the scenes of the girls getting ready for the big dance down at the old plantation. Remember the gal firmly grasping the bedpost while her mother, or little sister, tugged mightily at the strings of her . . . well, to put it bluntly . . . the thing she wore around her waist to convince some lad in tight pants that she really only measured twelve and a half inches at this vital spot! The structural strength of the garment was indeed wondrous! Later attempts at designing the same bit of underclothing relied upon whale bone, and later, steel stays to give it the ability to withstand great loads.

So what has this to do with R/C ships? The same ideas that went into the design of these cinchers are similar to the problems that we face today . . . how to make a little withstand a lot!

Not long ago, I saw one of my good friends take home a bunch of sticks as a result of putting too much dependence upon a lightly designed aircraft. Back about six or seven years ago, a number of fine ships were designed and kitted. These aircraft were very good and well designed for their time and use, and are still very airworthy airplanes. BUT — they were designed to fly at a certain speed, to withstand certain wing loads, and not to have too great a G load put upon them. This friend's ship was a good case — a Tri Squire, originally designed to fly with an .09, or perhaps a .15, on single channel. With this power, not carrying much radio weight, and flown through moderate stunts, it is a wonderful ship. A good all around design and one that any beginner would be at home with. True to the modern trend, this ship wound up with added controls of elevator and throttle, and an additional pound of weight. Power to make the ship stand up and talk was a Veco .35. This was a pretty hot little ship, and our friend's son, at age 13, had a ball flying this bomb around the sky, showing the big guys how it's done. You could see the wings flex on tight rudder rolls!

One day the Tri-Squire was pushed a bit past her limit, an outside loop was tried, and it suddenly became alarmingly apparent that it wasn't going to tuck under. Our 13 year old

buddy did what comes naturally and pulled full up. The resultant G-loads were too much for the wing and it sheared off right at the fuselage — the body containing the radio gear roared through an interesting arc and crammed itself deep into the hard earth. Cause? A wing designed for a specific weight, to fly at a specific slow rate of speed, snapped because too much was asked of it.

Just a short time ago, another flying partner was out with his beautiful Tri-Pacer, HobbyPox finish, and a good stable flier. All in all, a nice ship, except that he, too, felt more at home with a .45 in the nose. Eventual result? A snapped wing, a smashed ship, and back to the building board. It's going to happen to some of the more modern ships in the near future as we attempt to imitate the lads at Detroit and cram more and more power into the nose of our ships.

We need to pay attention to the design of wings, beef up the center section, add a little more weight . . . goodness knows, we are using more power now than is really needed to get the job done. One of the best ways of adding strength to the center section is to use a full-depth hard balsa spar that goes straight through the wing center at the main spars and sticks out into the wing panels about a third of the span. Most plywood dihedral braces end at just about the place that the wing rests on the fuselage and where the rubber bands cut into it. Extend the doubler, build the center structure stronger, and extend this section. Also, wrap the center section with cloth soaked in white glue, or fibreglass cloth, or Celastic. A band about five inches wide at the center is much better than a narrow ribbon.

These precautions are not only needed for the older ships, but also a lot of the newer breed. An Orion with a Fox .59 in the snout is a good candidate for a folded wing, as is the Falcon with a big engine. This is not to say that all of these ships are not well designed, they are beautiful examples of the art, but as characters at the end of the sticks and levers subject them to an awful lot of stress for which they were not necessarily intended.

Another source of possible trouble is the servo board. The use of such a board, or tray, is a big help in removing servos, in checking set-up of control layouts, and in installation, but it is a

concentrated one-pound mass that can tear the living hell out of your receiver in a crash. All of you who have had a smash that was hard enough to rip the servo board loose and let it wham into your receiver, hold up your hands!

I believe that part of the secret of design is to plan ahead for the eventual hard contact with the ground, and to design the ship with this in mind. Locating the servos on the fuselage side is not the most lovely way to do it, what with bolt heads protruding into the breeze, but it is practical. In the event of a hard crash, the nose of the ship will compress back into the body, causing the sides to split AWAY from the center section. With the servos mounted on the sides they will split away from the receiver, and if it is well padded in foam with an assist from leftover styro-foam blocks, will come through undamaged.

You can, alternately, devise a servo board to mount on each side, held in place with blocks of wood glued to the side if you really don't want those bolt heads to mar the finish of your bird.

The use of expanded polystyrene bead foam is becoming widespread for wings and stabilizers, but the electronic industry is way ahead of us when it comes to packaging. We use foam rubber to cushion the shock to the receiver and to the battery pack, but a box made out of a combination of rubber and bead foam would give it almost complete protection. The ideal ship would be built around a 1# density block in the nose with areas hollowed out for the tank, nose gear and pushrod, battery pack, and receiver. If we built our ships a little larger even the servos would rest in caves carved in the foam. This would give the receiver much more protection.

While on the subject of receiver protection, another spot of trouble is in simply wedging the receiver into the fuselage, padded on all sides with chunks of foam rubber. When and if a crash does happen, the foam springs away from the receiver and this bit of electronic goodie is left free to fly through the air with no protection at all. A much better way to take care of the receiver is to build a box of foam that just fits the receiver can and encloses it on all sides. For added protection from dust and fuel, wrap the receiver can in Saran Wrap before inserting it into the rubber box. It is even better if you then wrap the rubber box in another layer of Saran Wrap. Fuel tanks have been known to leak, and if they do, your foam box won't be ruined with castor oil, and your reed bank won't be clogged up with fuel, and later, with sticky dust!

Hinges are a pretty tough situation. The best answer on hinges hasn't been

(Continued on Page 64)





AL WILLIAMS' FAMOUS . . .

## GRUMMAN GULFHAWK

BY LOU PERRETTI

Scale R/C For .61's and Proportional



**A**L WILLIAMS' famous Gulfhawk, the Grumman G-22 has always been the apple of my eye. This chubby little re-orange biplane is a sight to behold in action. The lack of good dependable proportional equipment was the main reason I didn't venture into this project in years past — I'm not the type of guy that pays \$500 or more only to watch a beautiful scale ship bite the dust! Then, a few months ago, I received my E. K. Logictrol 7 from Harvey Thomassian with the assurance that my rig was thoroughly flight tested, and that if I followed the charging instructions, no

loss of signal or glitches would be experienced. Let me say here and now that I have never had a finer piece of equipment in my possession — I was off one and one-half turns on my receiver tuning slug and never lost signal for one moment! Need I say more? Here was the equipment for the Gulfhawk project!

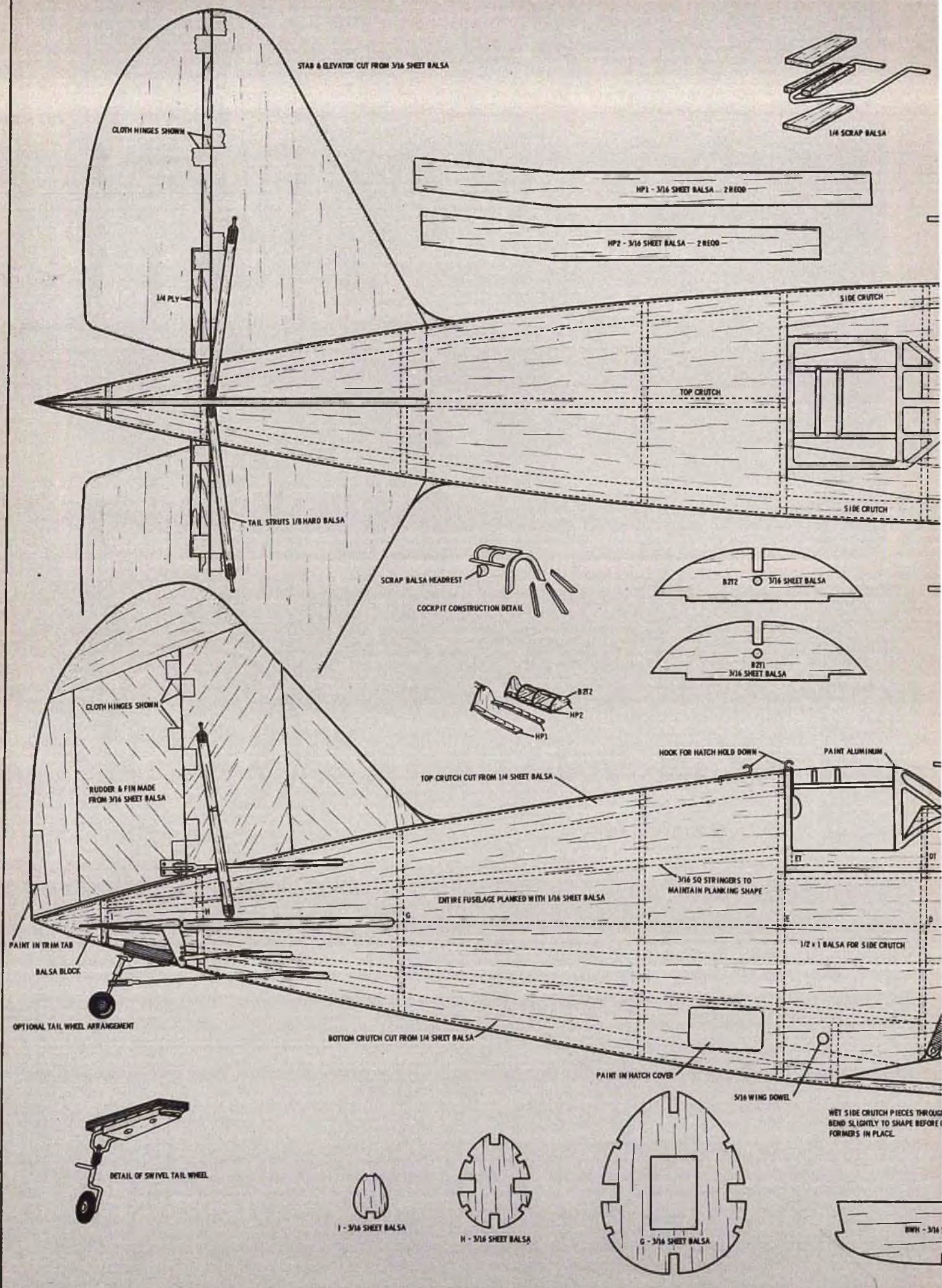
After installing the new gear into the Grumman's fat belly, getting all linkages, incidences, and thrust settings properly established, I proceeded to paint and put the final trim lines on the little biplane. I was fortunate in having

one of the RC'ers from the WRAMS who actually worked on the G-22 help with these details.

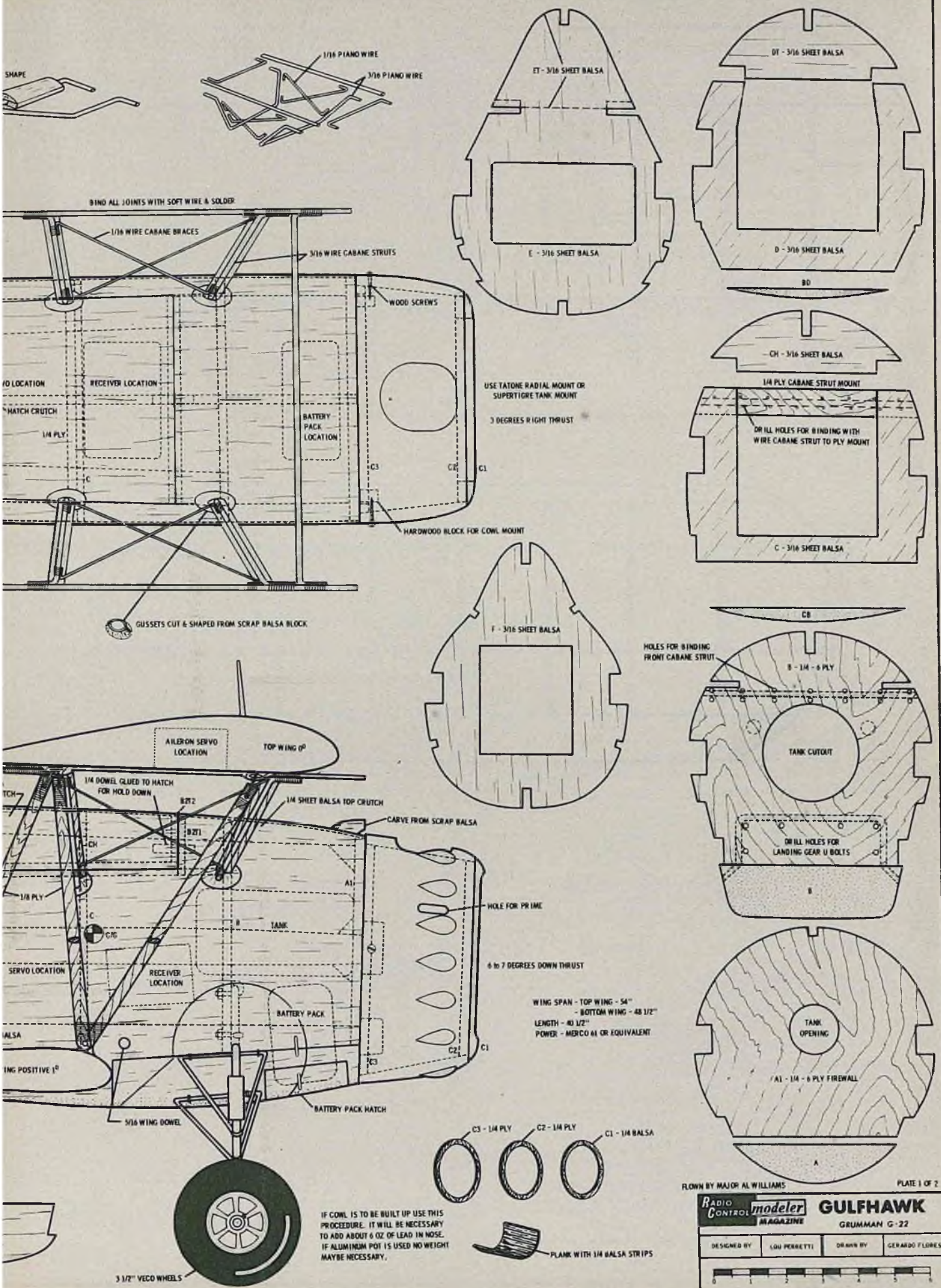
The day finally arrived for the Grumman's first flight. It was the first Sunday of October — a beautiful warm day with no wind to speak of, and a clear blue sky with just a few puffs of clouds here and there. I don't know how the word got around, but when I arrived at the field, there was a waiting crowd! If I didn't fly that day I think I would have been tarred and feathered!

*(Continued on Page 22)*

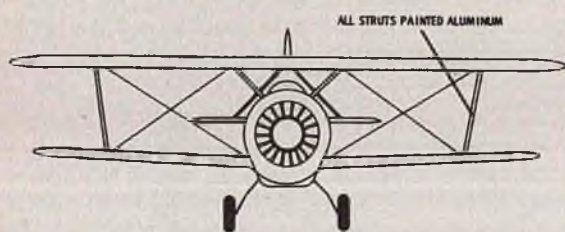
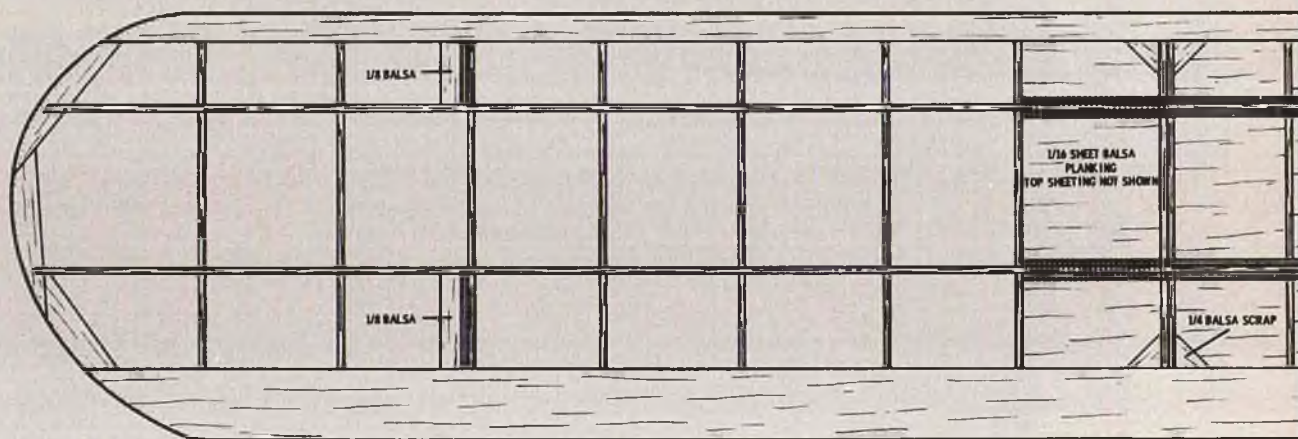
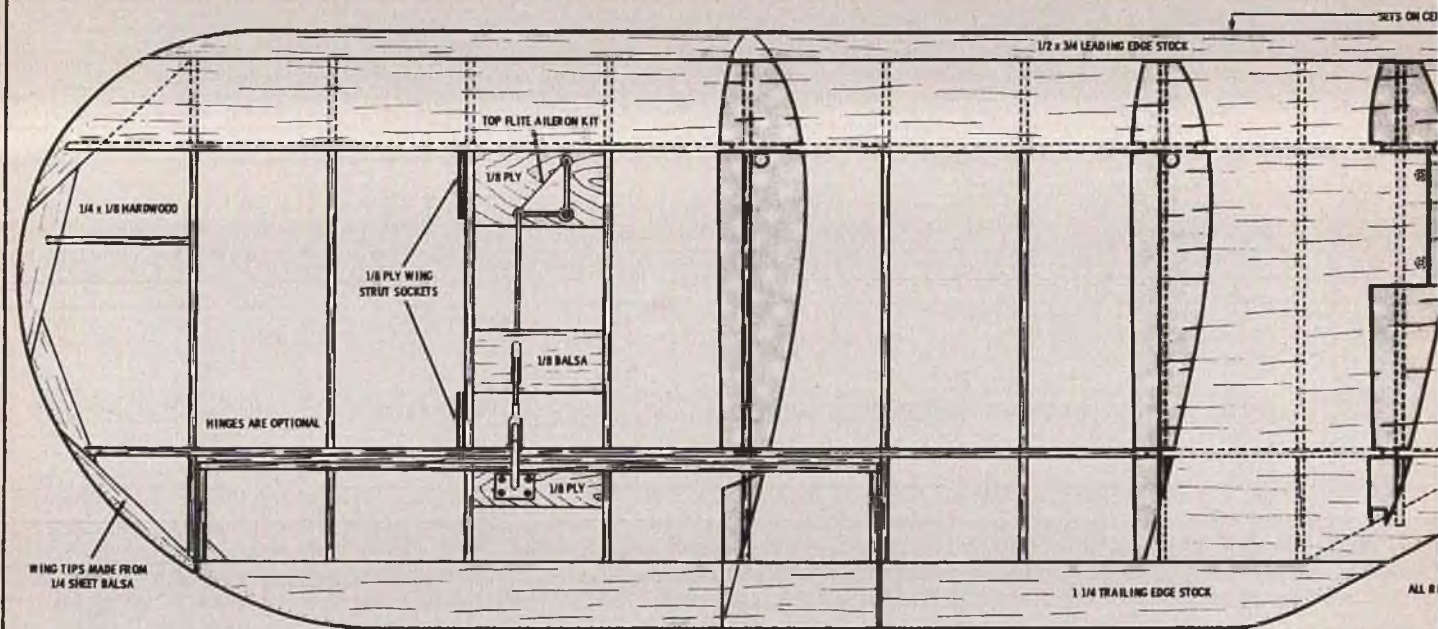




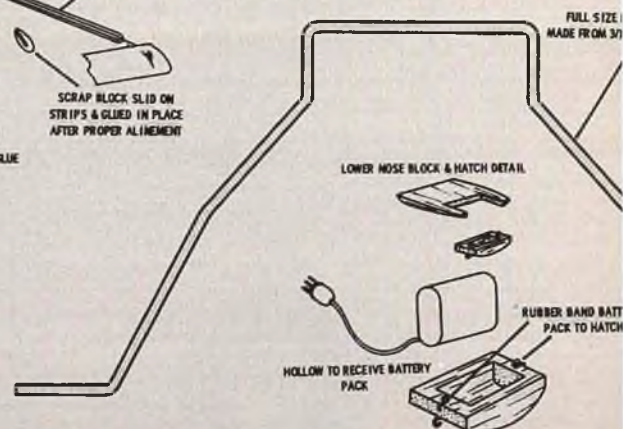
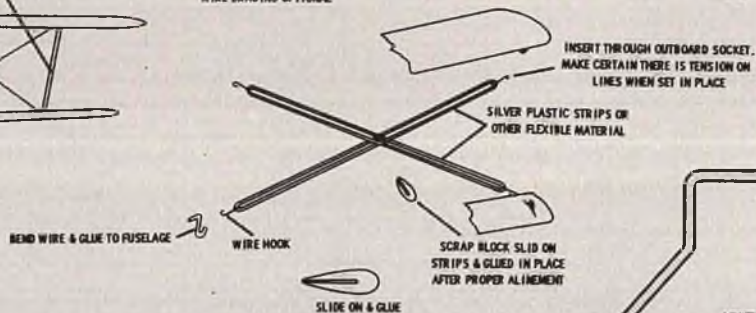




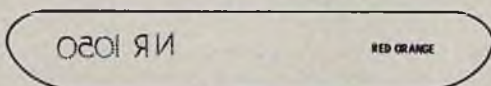
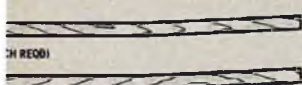
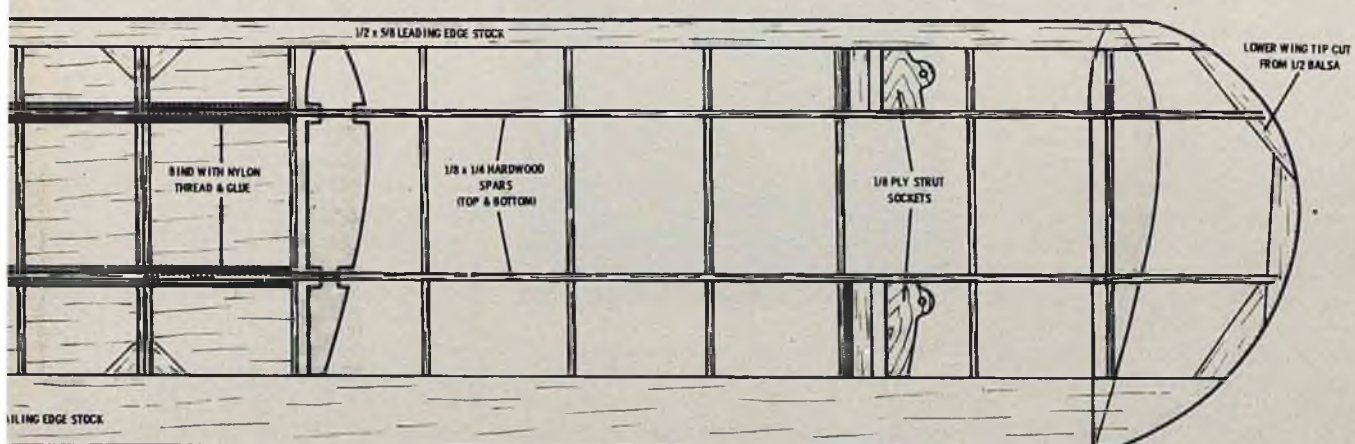
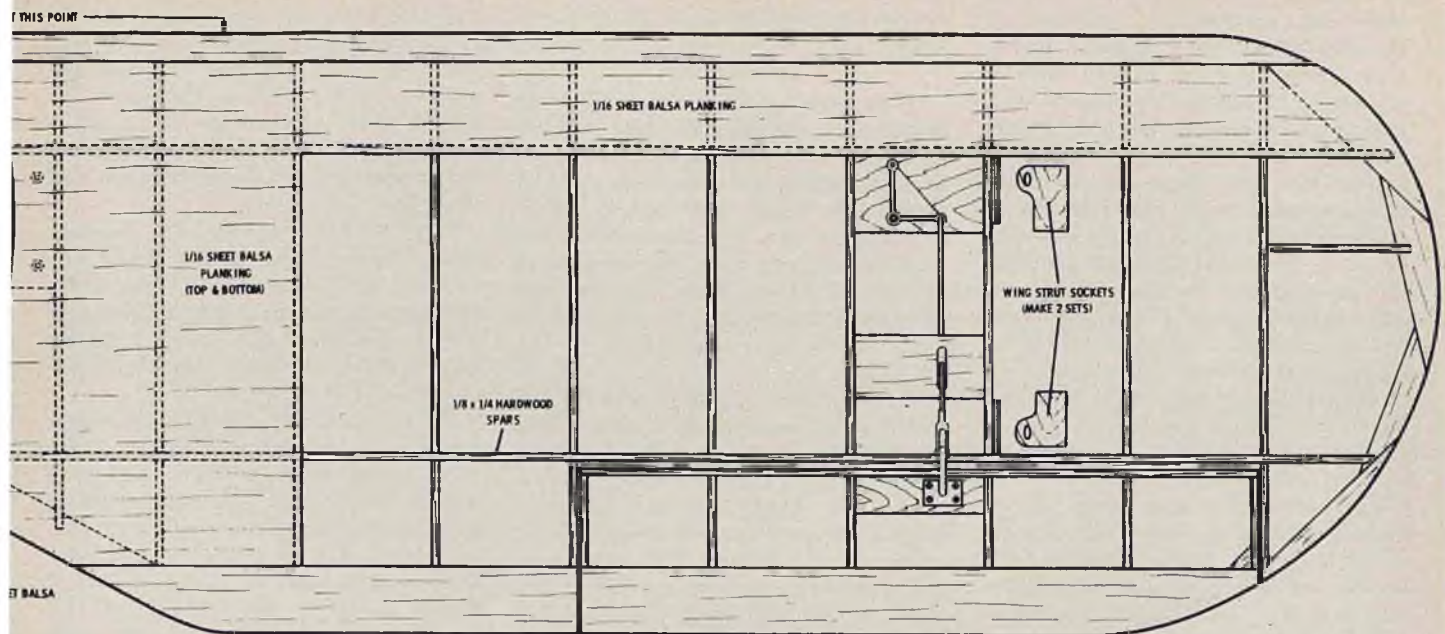




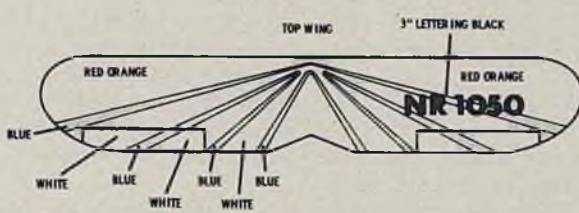
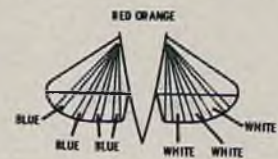
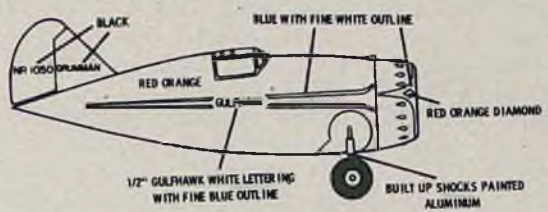
WIRE BRACING OPTIONAL







10 NO. LEFT SIDE OF LOWER WING - PAINT BLACK



FLOWN BY MAJOR AL WILLIAMS

PLATE 2 OF 2

**RADIO CONTROL modeler**

**GULFhawk**

GRUMMAN G-22

DESIGNED BY LOU PERRETTI DRAWN BY GERARDO FLORES

0 1 2 3 4 5 6 7 8 9 10



With no way out, I gassed old fat belly cup, checked my controls, and everything was "go." A flying buddy, Gene Hauer, had the battery leads on the Merco 61 before I even knew what happened. I primed the mill, flipped the prop, and the Merco coughed. I flipped the prop again and it caught and proceeded to rev up. I let the excess prime run out, the motor sounding husky in the radial cowl. Slowly I brought back the throttle until she was purring like a kitten. I nodded to Gene and he lifted the Grumman and set her lightly on the center of the strip.

All eyes were focused on the little fat bipe. Nobody cranked engines or checked out equipment. The WRAMS member who worked on the full-scale G-22 was so close that Gene had to move him out of the way. The moment of truth was at hand! I pushed the throttle all the way and the Merco sprang to life. The Grumman began to roll slowly, then faster and faster. I was watching constantly for any veering tendencies, having been told by a "professional" that bipes are no good as they always ground loop!

At about fifty feet down the runaway the Grumman's tail was high and she was moving straight as a dart. I eased back ever so slowly on the stick and she broke ground, climbing out nice, straight, and steady. No one can properly voice the beauty one beholds watching this scale creation performing like its scale counterpart, the afternoon sun was reflecting off this bright red-orange ship with its blue-white sunbursted wing and tail in a manner that would be impossible to describe. It was literally breath-taking!

The Grumman Gulfhawk handled beautifully. Up she went to about 800 feet—rolls, loops, inverted flight . . . beautiful! Enough for the first flight. I throttled back to one-quarter throttle, and went into my landing pattern approach to the left on the final leg. I was still too high, so we went around again, this time at full retarded throttle and a little down trim. This baby doesn't want to come down! Now she's starting to settle nicely. I lined her up on the runway about one-quarter mile out at about 150 feet altitude, and she's settling like a real lady. Her main gear touched down about fifty feet in front of me, the tail wheel still high. I eased back on the stick and the tail wheel touched and settled as she rolls by. The spectator applause was tremendous!

The RC'er that worked on the full-scale G-22 was pumping my arm and slapping me on the back so hard that I almost dropped my Logictrol transmitter! What a feeling of accomplishment!

To date, I have many flights on the Grumman, each better than the preceding one. I hope that many of you will build this scale bipe and enjoy the

feeling of pride and accomplishment the building and flying of this ship will bring you.

### Construction

The construction of the G-22 looks much more complicated than it really is. If you follow the construction steps, as listed here, the ship should go together quite easily. The method of construction is easy, yet strong and non-time consuming. The first step is to cut out all of the body formers from the specified materials. I used Sig R/C grade balsa and found this to do the job nicely.

The next step is to drill and cut out all the holes marked—tank and cabane mounts, landing gear, plus motor mounting and throttle linkage holes, cowl mount block and lead balancing holes. Next, cut the two crutch beams, tapering and marking each position on the crutches for former location. Wet the crutches thoroughly and pre-bend each one slightly, being careful not to



crack them by too much pressure.

Double glue firewall A to the crutches, then the tail former and tail block using wood clamps or rubber bands to hold the crutches on the formers. Now put formers B, C, D, and all others in place while the crutches are still damp. You should glue a temporary scrap crutch crossbar, made from  $\frac{3}{16}$ " balsa, first at formers C, D, E, and F, so that the crutch piece will not force these formers, splitting them as they dry.

Once all the formers are glued in place and thoroughly dry, glue the lower wing well crutches in position. Cement the hatch cover base in place and glue in the aft fuselage stringers. The next step is to mount the landing gear, cabane spring wire struts, and tail wheel gear.

By this time your hatch base should be dry. Take a piece of wax paper and lay this across the hatch cover opening, then proceed to build the hatch right on the fuselage so that proper alignment is insured.

Now cut the battery holder block and then insert the throttle push rod and motor mount (either Tatone radial or built-up) plus the tank with feed-through tubing. When this operation is

completed, sand the entire structure so that the planking will be smooth and not lumped in various spots. Before planking, dope all formers and the crutch members back to Former C, inside and out, so that any fuel leakage will not deteriorate the structure from the inside. Use the butyrate dope full strength.

Now we are ready for the planking operation.  $\frac{3}{16}$ " balsa sheet is used. First, remove the hatch frame, then plank the fuselage and hatch cover. When completed, sand the entire fuselage, being careful not to sand too deep as we are only using  $\frac{3}{16}$ " material.

After this, insert the forward hatch hold-down dowel and all other wire hold downs. Glue in place. The next step is to complete the cabane structure, binding the wire with copper wire wrappings. Check alignment and incidence angles carefully, then solder all joints. Build up the fairings for the cabane struts. Complete the scale gear with built-up balsa and wire shock assembly.

Next, cut out notches for the elevator and control rod slots. Take a straight piece of  $\frac{3}{16}$ " stock balsa, or a three foot ruler, and rubber band on to the cabane structure as if it were a wing. Now glue in the stab, lining it up horizontally with the simulated top wing. Next, use some balsa filler to cover all marks and bruises, then sand smooth.

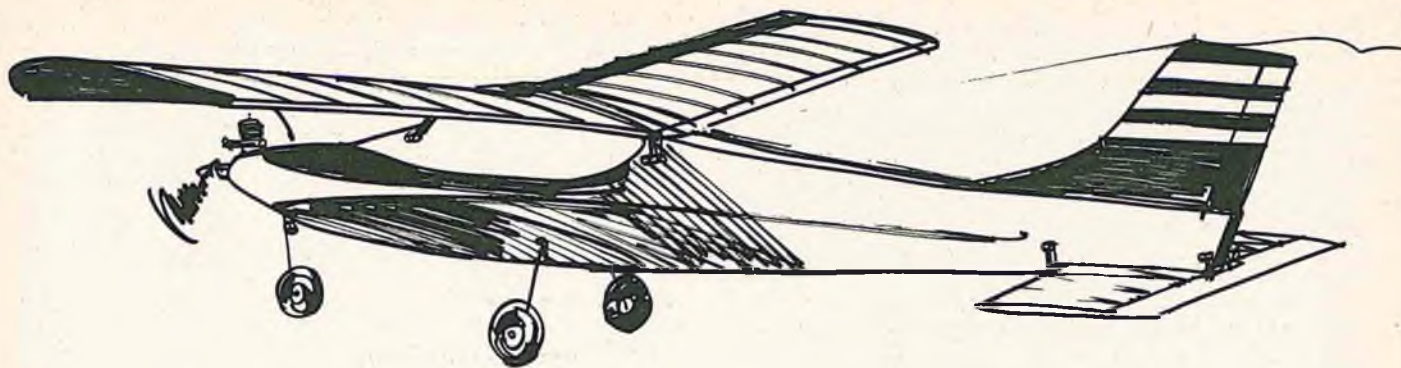
I used four coats of AeroGloss wood sealer on the fuselage. If the cowl is built-up, use filler coat inside and out. The cowl itself is so spacious that I found that I didn't need an exhaust extension as there is plenty of distance between the engine and cowl. But remember that fuel will eat up raw wood, so seal it well! Drain holes should be drilled in the bottom of the cowl. The cowl should be mounted so that there is at least  $\frac{1}{8}$ " space between the cowl and firewall for adequate engine cooling. Be sure to mount the elevator and rudder before using the sanding sealer.

**Important:** The elevator throw should be limited to  $\frac{1}{4}$ " up or down, for a total of  $\frac{1}{2}$ " thrown. The rudder should be the maximum you can swing. Bipes need a lot of right and left and little up and down.

The wings are straightforward. The top wing has no dihedral, and is set at zero degree incidence. Bottom wing does have dihedral and 1 degree positive incidence. After this, put in the cockpit detail with scale pilot (Williams Bros. Standard 2"). Servo mounting is by way of a built-up platform. This is not illustrated since there are so many different types of radio installation, and each RC'er is familiar with his own equipment and methods for installing same. My EK servos were mounted

(Continued on Page 57)





# Return of the Ghost

**S**IMPLE proportional control has been with us for a long time. But it has never reached the heights of popularity that it will attain in the months to come. In its various forms, simple proportional has been called pulse rudder, Galloping Ghost, Kicking Ghost, Kicking Duck, Simpul-Simul, etc. To the newcomer to R/C, these terms simply add to the collective mass of confusion that confronts him when he attempts to decide which type of radio system will give him the most for the money he has to spend on his hobby. For this reason, let's discard the various names—they are just that, names given to various ways, both electronic and mechanical, of deriving proportional control from a single channel radio system. Let's look at the overall picture and see what **you** can expect . . . what **you** can do with simple proportional control.

This is the age of proportional control. The pages of this magazine contain advertisements for "full-house" proportional systems ranging in price from \$300 to nearly \$700. There is no doubt in any RC'er's mind that proportional control is far more precise, smooth, and exacting than "bang-bang" type of control, such as single channel escapements, servos, or multi-channel reed systems. But what if you cannot, or do not wish to, afford one of the more expensive systems? What can you do for a lesser sum? Let's say, \$150 maximum?

Very simply stated, proportional control means moving a control surface in degrees proportionate to the movement of the stick at the transmitter. Contrast this to a single channel escapement or servo, or a multi channel

reed system, where full movement of the control surface results from signaling a control from the transmitter. In the full-house proportional system, an individual servo is normally used for each control surface, such as rudder, elevator, aileron, motor, etc. The terms "digital" or "analog" simply refer to the type of electronics used to convey and decode the transmitted information. For our purposes, we will not delve into the complexities of the various types of feedback proportional systems, since our goal here is to see what we can obtain by simpler methods and what results we can hope to achieve with these efforts.

In a simple proportional system we are using a single channel transmitter to transmit a single tone to the receiver. By "breaking up" this tone in various ways, we can achieve more than a single result, or function. In past years, many methods have been contrived to obtain the maximum results from a single channel system. Unfortunately, most of these "systems" depended upon every individual component working to complete perfection in order to attain the desired results. And, although some excellent flying was accomplished by those individuals who had the time and patience to see the whole thing through, it became known as a "tinkerer's art." One spring on a fragile motor, a slightly mis-bent "birdcage" out at the tail, a pulser that wasn't too happy with a given transmitter, a variety of relays that had to be continually adjusted, were all part of the game if you wanted to participate. Happily, the story today is different. Manufacturers, realizing the impact of the "big rigs" on the

market, also realized that there were many, many individuals who would like to go the proportional route but simply couldn't justify a \$500 expenditure out of the grocery money!

In looking at the simple proportional picture, let's set a goal of the utmost reliability and control with an absolute minimum of "tinkering." If you're an experimenter and want to add this or that gimmick, go ahead. This article is strictly for the RC'er who wants reliable proportional control that will be as close to an "out-of-the-box" system as possible, utilizing commercially available equipment.

Before going any further, let's set down a few requirements. First, we want control of rudder, elevator and motor. The transmitter will be a single channel unit of good design with a built-in electronic pulser. No add-on pulsers and no pulsers with relays to adjust. The single channel receiver will be of proven design, preferably super-het for maximum immunity to interference, and one that is virtually immune to interference from motor driven ser-







RCM staff members Don Dewey and Bill O'Brien take turns cranking the Cox .010. Bill Welker of CitizenShip holds the Pipsqueak on the chimney.



RCM's Editor with a high launch to clear telephone lines at outside right of photo. Ed Thompson takes the photos.



The landing . . . with room to spare on the gravel rooftop.



The victorious four — Ed, Bill, Don, and Bill Welker. Photo by Sally Dewey on lower sundeck.

vos. It will also be as light and compact as possible to allow it to be used in the smaller .020 sized aircraft as well as the larger ships. The servomechanism must be capable of providing proportional control to the rudder and elevator, and ideally, positionable throttle. Complicated wire linkages out at the tail are absolutely verboten. The servo must transmit its mechanical energy to the surfaces via the standard pushrods used in the full-house systems. The servo must also be a unit that can withstand a lot of flying without continual adjustment. It must also have adequate power to adequately move the surfaces on a ship from .020 size to .35, giving the individual RC'er his choice of aircraft size. The overall result of the simple proportional system must allow the RC'er to have the precise control necessary to fly from restricted areas, such as schoolyards, hillsides, parking lots, etc., where permitted. And, keep in mind, that we said less than \$150!

Our own experiments in the field of simple proportional are not those of a "Johnny-come-lately." Long before this

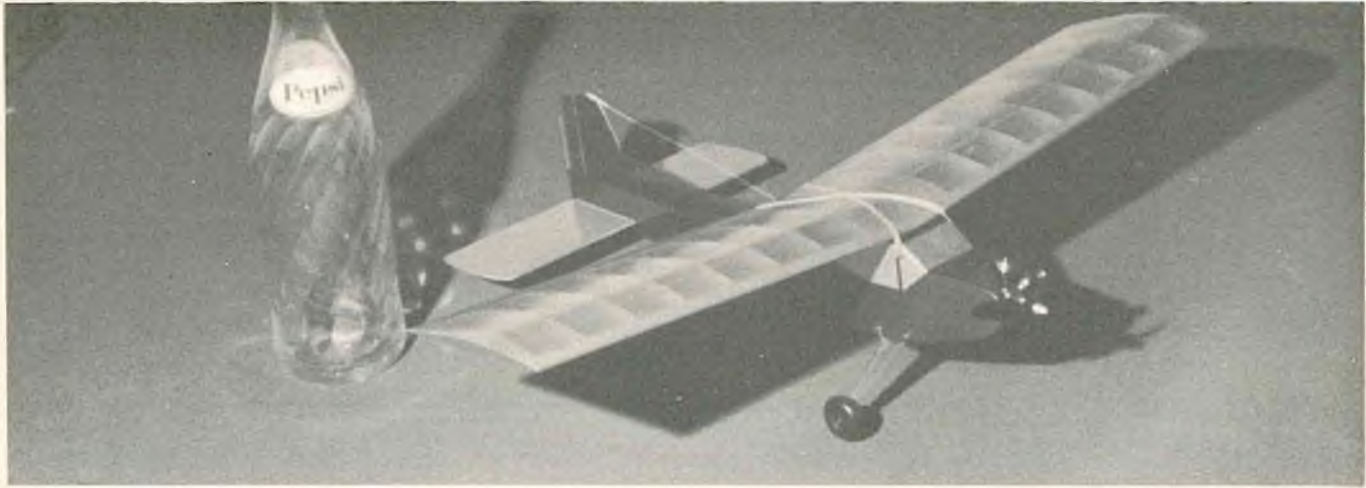
magazine was started, we experimented with virtually all of the techniques for achieving single channel proportional — the original Worth Simpul-Simul system, simple relay actuators, magnetic actuators, go-around Mighty Midgets, and the like. Since the establishment of RCM, manufacturers of simple proportional equipment have been sending many actuators, pulsers, and a variety of components for testing and evaluation, attempting to develop just what we are talking about in this article. We have been testing, reporting, and consulting with John Maloney at World Engines, Bob Schmidt at Min-X, Herb Tomoser at Tomoser, and Herb Abrams at Rand Manufacturing. In addition, we have had the assistance of many individual modelers who have worked and experimented in this field for many years. One of the most notable contributions was from Dave Robelen who developed the Pipsqueak design and actuator in this issue. And, although this home-made actuator and linkage system does not fill the requirements of this particular article, it did give a very

startling demonstration of the capabilities of simple single channel proportional. As you will see from the pictures, the Pipsqueak was flown from a small confined rooftop area of my own house, negotiating such obstacles as trees, TV antennas, power lines, and the like — being launched and landing in this small area. The flying was accomplished by individuals who had never attempted this feat before, nor were particularly experienced in the field of simple proportional control. This was not intended to be a bit of exhibitionism, but rather, to find out what we could expect from even the smallest plane and system. The precise control proved the feasibility and potential of simple proportional. Now, let's simplify it even further.

Two transmitter-pulser combinations stand out above all others in our own tests. These are the Controaire Galloping Ghost and the Min-X Pulsemite units. Both are completely electronic in design and no add-on units are neces-

(Continued on Page 55)





# THE PIPSQUEAK

BY DAVE ROBELEN

**Outstanding .010 Sportster for Galloping Ghost. Plus  
Complete Construction Details for Lightweight Actuator.**

**T**HE Pipsqueak model is a general purpose small-field airplane, scaled down from the Midwest Esquire and designed for the Cox Tee Dee .01. Special emphasis is made on the airplane's ability with a dual proportional system. The author has developed what he feels is the smallest and lightest Galloping Ghost system that will yield smooth, positive control. The heart of any GG system is the actuator, so a special unit was built to meet the following requirements:

- (1) High neutral pulse rate to eliminate any trace of gallop.
- (2) Light weight (25 grams).
- (3) Sufficient control movement for stunting and tight turns in severely restricted areas.
- (4) Enough control power to fly an average .010 or .020 model.

I have flown the Pipsqueak for well over a hundred flights and now feel that all of these goals have been met. Once the system has been installed in the plane and put into operation, no further adjustments need be made. Two additional fringe benefits that have resulted from this actuator are low battery drain (150 Ma. pulsing in neutral), and an excellent fail-safe. Upon loss of signal, the actuator will yield neutral rudder and up-elevator.

The only electric motor that has been

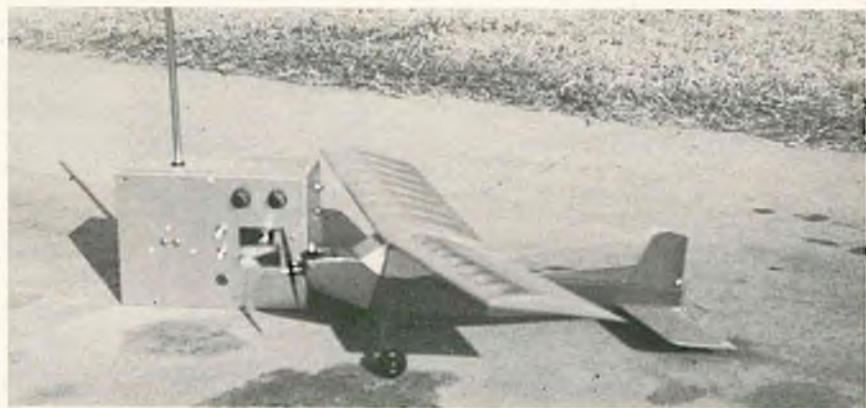
found completely satisfactory for our requirements is the Micro-Mo series. I have used the smaller TO-5 for this actuator. For larger ships in the .049 range, the TO-3 should be more than adequate. All actuator dimensions given with this article will be for the smaller unit and the Micro-Mo TO-5. Construction of the actuator itself requires access to a small drill press and some scraps of aluminum, the latter available from any local machine shop. Detailed instructions for building this actuator are given later on in this article, but a few general

notes are in order at this time.

The main idea behind this entire project is lightness—remove as much metal as possible without affecting strength. Good gear mesh is important for minimum friction, so take a little care at that point. The foam pad upon which the actuator is mounted is very important—don't leave it out! The Micro-Mo motor has a very delicate armature and will not tolerate excessive impact shock or vibration.

The balance of the radio system is quite straightforward. I have used sev-

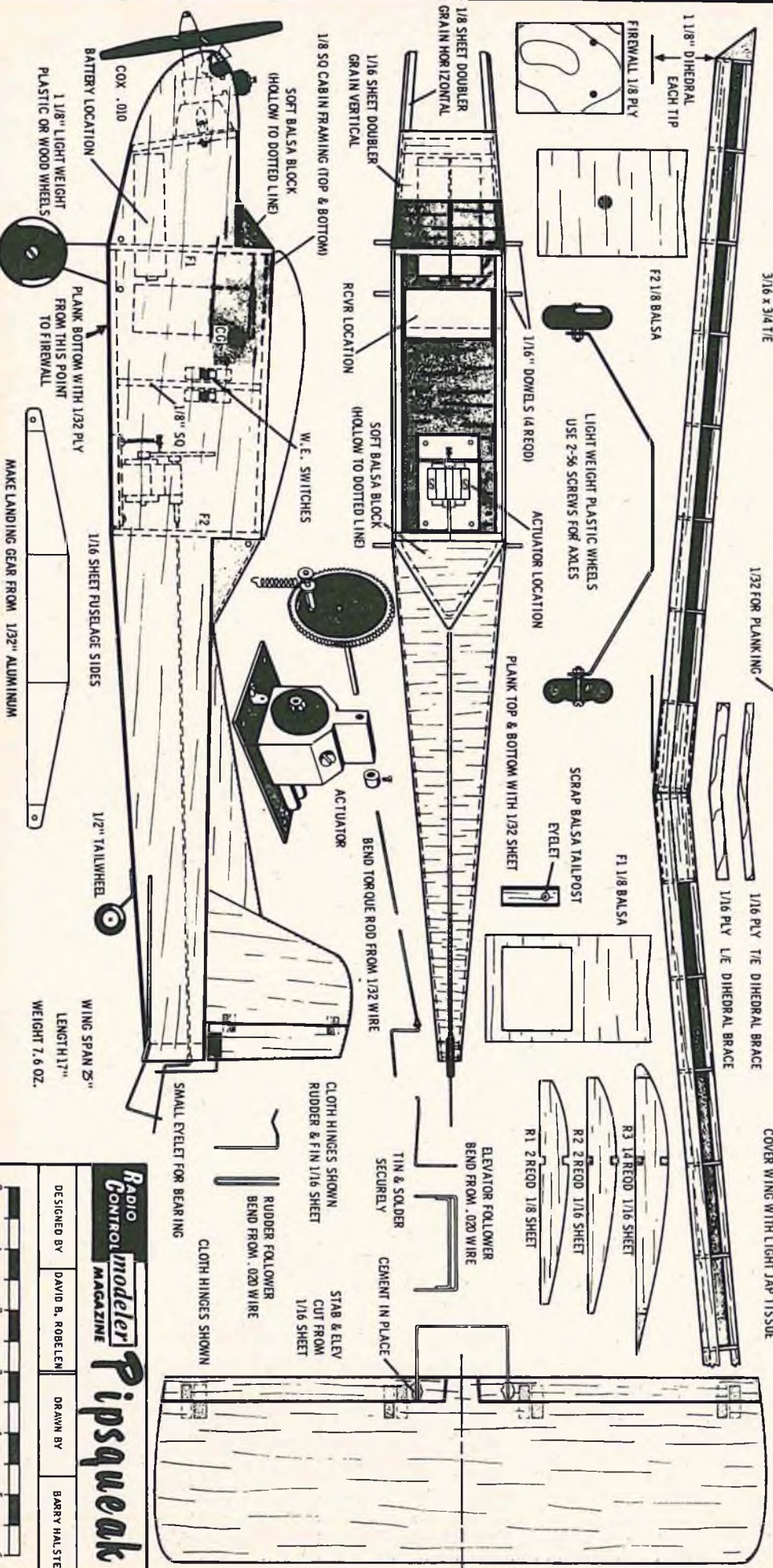
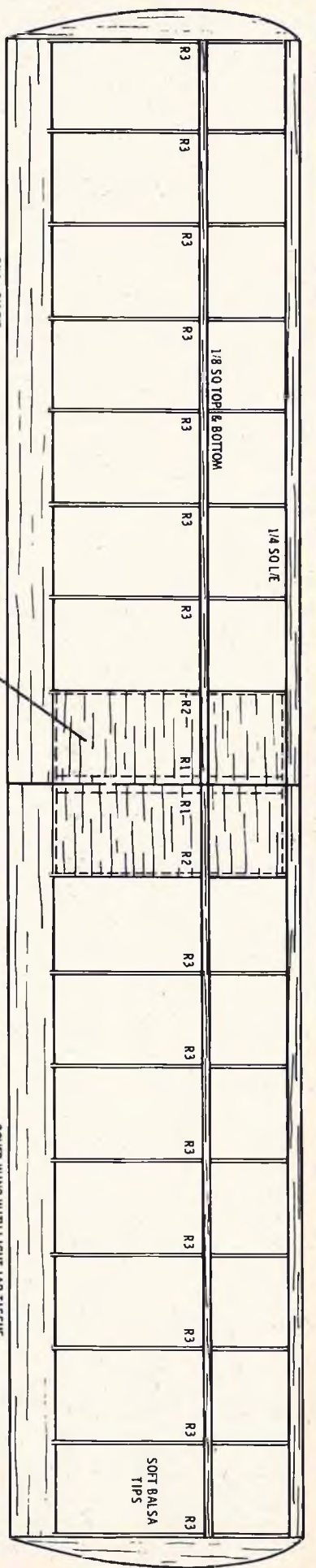
Note relative size of Pipsqueak next to normal transmitter-pulsar.







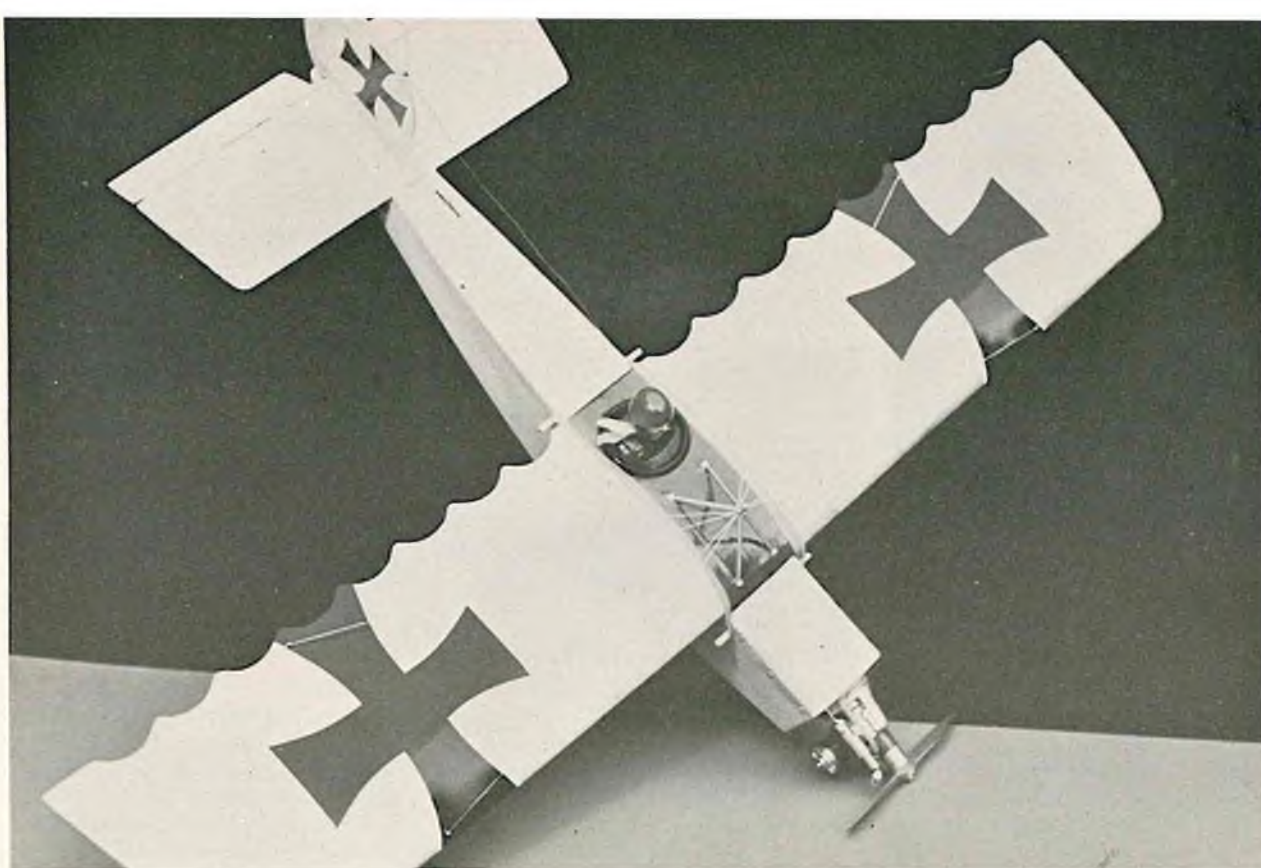












# WÖLFMEISTER LR-3

BY DON DEWEY

**Scale (?) R/C Version of a Not-Obscure-Enough  
WW-1 Crate. For Galloping Ghost and .049 to .09 Mills.**



**T**HE Wölfmeister is a scale model of a very obscure German aircraft of WWI. Authentic sources available to the author disclosed that only one was built, and that by the pilot himself, Baron Wolfgang von Reichard. During the glorious days of aviation, those days of iron men and wooden fliers, it was the aristocracy that took to the air to meet in aerial combat with their nonetheless aristocratic enemy. The Baron, whose ideas even then, were considered radical and quite impractical, was a great aviation visionary. He was also a visionary in other endeavors as well,

RCM's Chuck Waas holds the author's Wölfmeister . . . known in some circles as Dewey's folly.

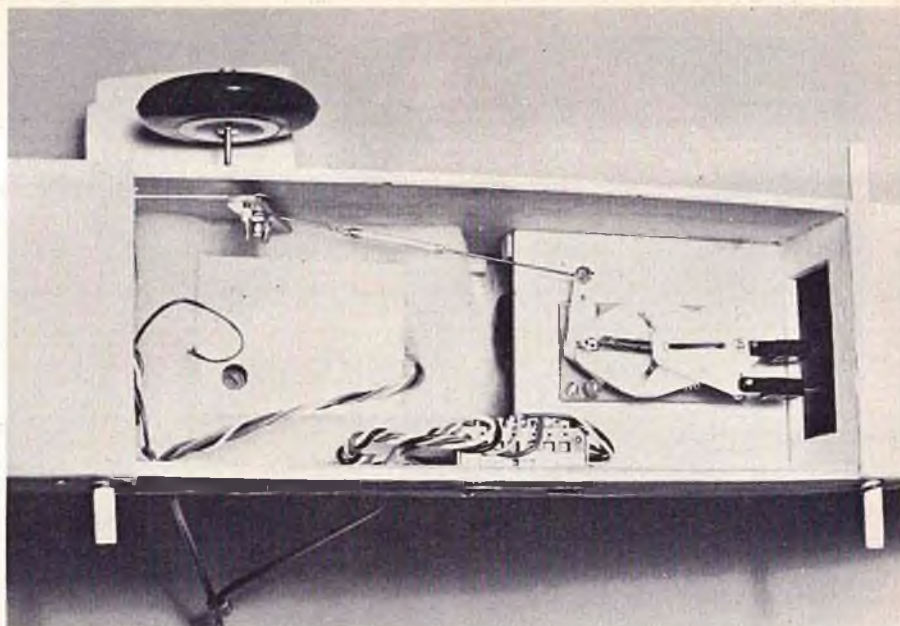
which led to his ultimate undoing, as we shall see later.

As history discloses, the Baron, seated in his Wölfmeister, led his squadron of German aces up in the skies at each light of dawn. Flying high over the trenches in no man's land, they would look for the nearest cloud cover, where they would wait for their adversaries from the A.E.F. and R.A.F. Upon contacting the enemy, they would fly both offensive and defensive maneuvers in full sight of the foot soldiers in the trenches far below. Without firing a shot they would carry on the pantomime for a convincing length of time, then disappear into the cloud cover. From this point, German and Allied planes together, in integrated formation, flew to a small, and undisclosed village in France where an understand-





The Rand LR-3 prototype. One of the finest actuators we have ever seen or tested. Right: the LR-3 installed in the Baron's Box.



ing farmer had agreed to the use of his south forty as a landing field. From here the intrepid masters of the air would retire to the village pub. A flip of the coin would determine who would buy the rounds for the afternoon — the loser also being required to punch a few convincing holes in a few of the aircraft for the benefit of the top brass back at their respective aerodromes.

Baron Von Reichard's eventual absence from these daily sessions wasn't noticed at first. When it was discovered, the gallant band of flying men set out to discover the whereabouts of their comrade-in-arms. Primarily, that is, because he hadn't been there to buy his fair share of the spirits.

Just what fate had befallen the missing warrior was not immediately disclosed. A few days later, however, a lone SE-5 flew low over the German aerodrome and dropped a wreath with the Baron's name written upon it. Their fallen comrade, it appeared, had fought his last duel in the sky.

Fate was not to be that kindly disposed, however. As it actually turned out, the friendly farmer was not so understanding after all when he found his only daughter in his haystack with the Baron. A brief wedding, along with much beer and the ever present and somewhat ominous shotgun, took place a few days later. His comrades, to veil this tragic ending for a great flier, let it be known that their adversary had died a hero of the air.

Even today, the rotting remains of the one-of-a-kind and once-famous Wolfmeister rests in the south forty of a small farm in France. If you should ever be in the neighborhood of the Rhine Valley, look for it. You'll find a bunch of the Baron's grandchildren playing around this scourge of the skies. As a matter of fact, this is the

only way you'll be able to provide proof of scale for the next contest.

Just don't tarry too long around the Baron's haystack. . . .

#### Construction

Now that you're suitably turned on to get into the construction of the Wolfmeister, here are a few general notes concerning the model.

The plane was actually designed to test out the new LR-3 Galloping Ghost actuator from Rand Manufacturing Company. This actuator promised to take simple proportional off the tinkerer's bench and get into the air with the reliability of a much more exotic rig. Gone was the birdcage sticking out behind the north end of the southbound model. With this new servo, only two standard pushrods were required. Insofar as bench checks were concerned, this unit surpassed anything that we had seen to date. Now it was time to give it the acid, or flight, tests as it were.

Since I had never flown Galloping Ghost before, much less designed an airplane for this control form, I felt perfectly qualified for the task. Since we had already discovered that our old flying buddy, Herb Abrams at Rand, had put in quite a few flights on a .35 powered beast, we decided to make our test ship in the smaller range. The quickie-build that evolved looked like every other box-with-a-plank-wing, so we dressed it up a bit as a semi-scale type WW I machine. Although this is somewhere around an .049 size ship, we had a Cox .09 on the shelf and decided to use it in the nose. The actuator was installed, using the standard multi pushrod configuration with Du-Bro Kwik Links at the surfaces and Ellis keepers at the LR-3. A World Engines NND switcher was used so that a single battery supply of 2.4 to

3.6 volts could be used for the actuator, eliminating the need for a power supply on each side of the motor. A Controlaire SH-100 superhet receiver was used, and it too, used the same battery supply as the actuator. The LR-3 has the arc suppression components built-in, and the use of the SH-10C (which is quite immune to noise) insured a lightweight (5 ounce) installation. To eliminate a mess of wiring, we cut down an Accu-Tie printed circuit board, scraped off some of the copper lands, and secured the NND switcher to the board with C.E. Clear Seal. All wires then terminated at this common junction board. When we turned on the switch and reached down toward the actuator to find out how much thrust we were putting out, we almost lost a finger! That LR-3 is powerful!

The first flight of the Wolfmeister was a disaster going somewhere to happen. The elevator surfaces were too large and we had used too much throw. In addition, we didn't have enough right thrust in the engine. One other minor factor was a transmitter and pulser whose modulation was not compatible with the SH-100. After launching the ship off my hill, it streaked away with a vicious left turn. After getting that under control, I found that the amount of throw used was such that if you breathed on the transmitter stick you commanded a loop! A few minutes later the incompatible system created the inevitable — a loss of signal as the ship went out of range at about 500 yards distant.

The LR-3 responded by giving neutral rudder and elevator and low motor. With the torque problem, this resulted in a gentle left turn that ended on a slope of the hill about a hundred

(Continued on Page 52)







# AN APPROACH



## TO R/C FLYING SAFETY

BY CDR. LOU GUERRIERI, U.S.N.

### PART I

**I**N 1953 the United States Navy sustained five major aircraft accidents for every 10,000 hours they flew. Over 700 aircraft were destroyed. Sober reflection indicated that the fleet could very well run out of aircraft if the number of crashes continued that disastrous pace.

During fiscal year 1965 the Navy experienced only one and a quarter major accidents for each 10,000 hours of flight time. In terms of the radio control modeler this is the equivalent of 72 ten-minute flights every weekend for over 30 years before a crash-induced rebuilding job becomes necessary.

Fantastic! Yes! But why can't we shoot for the same goals — a crash-free session next weekend, crash-free sessions for the next month, crash-free sessions for the next year. Surely we cannot continue to pay the price in time and money, not to mention frustration, when faced with the ultimate in destruction — the balsa toothpick factory!

The Navy approached their problem

by instituting an aggressive aviation safety program. By following their lead a similar R/C flying safety program may enable our fraternity to approach the significant Navy results noted above. It will take a bit of headwork, some research, a smattering of luck, and a plan.

Naval Aviation Safety depends on a program of crash prevention and crash investigation. The theory is that if post-accident analysis can determine the cause of crashes, then pre-accident study can prevent them.

The basic concept is education. Learn what causes crashes and avoid these cause factors as best as possible. If a crash does indeed become a fact, conduct a complete investigation to determine the probable cause and get this information to the people flying the same type aircraft.

This same double-pronged program can pay dividends for every RC'er, regardless of his experience level.

#### The Prevention Program

Overall, the key to crash prevention

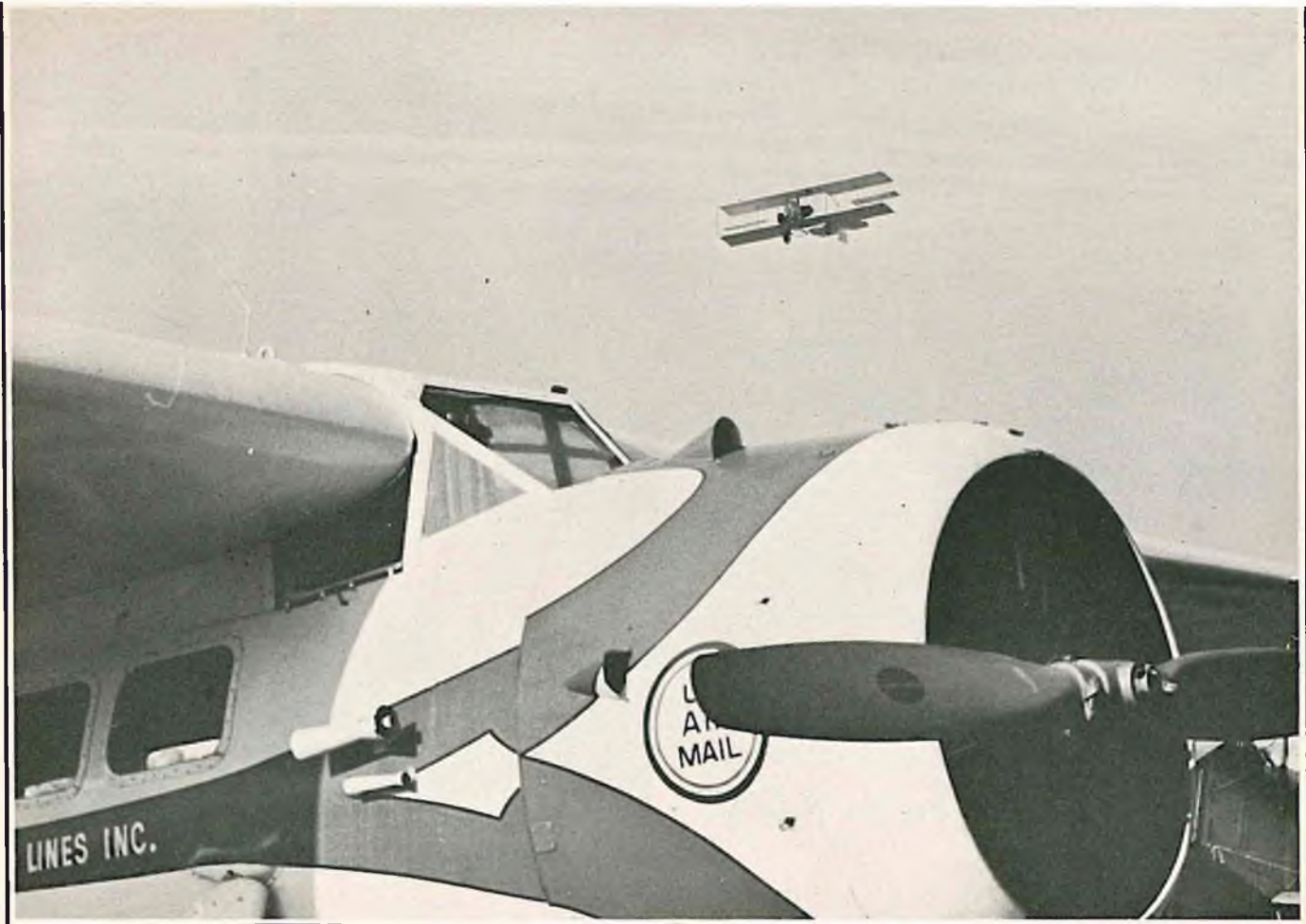
is to know what makes the R/C plane fly and what aerodynamic laws apply, what constitutes reliable operation of the electronic components of the system, and what flying procedures should be avoided.

A prevention program need not be formal. The education process should take advantage of the many fine articles to be found in all modeling magazines. All subjects relate to crash prevention in some degree. Particularly appropriate are articles on aerodynamics, how-to-articles (on flying a particular class aircraft, trimming, etc.), and hints and kinks columns. In the latter category look for items that increase the reliability of engines, electronic components and equipments, linkages, etc.

In this series we shall confine ourselves to an examination of only two aspects of the prevention program that may not have received adequate attention in our modeling press to this time.

*(Continued on Page 49)*





# M.A.T.S.

**First West Coast Model Airplane Trade Show, Sponsored by Garden Grove R/C Club, and Held at the Famed Movieland Of The Air Museum, Was an Outstanding Success in Every Way. Follow RCM's Chuck Waas on a Photo Tour of the Event That Brought Manufacturers and Their Displays From Virtually Every Part of the U.S. . . .**







RCM photo by Chuck Waas from Movieland Of The Air's 'Barnstormer.'



**A Pacesetter for Trade Shows, the M.A.T.S. Event is One You Can't Afford to Miss in Coming Years.**



Phil Kraft of Kraft Systems Inc.



Bill Welker and CitizenShip display.



RCM's Ken Willard listens to Bob Lien of Custom R/C.



Jack Blything grimaces as Doug Spreng taxis Woodcraft 'Early Bird.'



Dale Willoughby preparing to launch glider at Newport site.



Jerry Krause of E. K. Products taxis multi.





World Engines booth with John Maloney and Ed Thompson.



Willoughby Enterprises outdoor display.



Sid Axelrod of Top Flite with exciting new covering material.



Bob Elliott and Jerry Krause of E.K. display the Logictrol propo.



Power Inc.'s new nicad charger.



Don Mathes with Micro-Avionics proportional.



Cliff Weirick discusses the PCS proportional system.



Sterling Command Master system on display.



Foam wings and accessories from Foamcrafts.



Broadfield's Uni-Wing-A-Jig exhibit.



Partial display of the Sig Mfg. Co.'s line of products.



Spar's proportional system.



Bonner Digimite with Midget Mustang in background.



CG Models with Shoestring and new Sky-lane kit.



Dmeco models kit display.



Ace RC's line of radio control products.





## KING ORANGE INTERNATIONALS

Goodyear racer belonging to Bill Dart of New York. Orbit equipment, same ship flown in multi novice. Bill was second in Goodyear. Dart showed the usefulness of these ships for other events besides Goodyear as did race winner Jim Kirkland who also garnered a first in Scale with his Shoestring. Photo by Art Schroeder.

**Sponsored By the Remote Control Association of Central Florida, Inc., the 12th Annual K.O.I. Was An Outstanding Success. Over 400 Flights Total In All Categories. Jim Grier First In Class III Expert.**



Jimmy Grier's 'Anonymous,' winner of Multi Expert. Grier put on quite a show, overcoming the leads of Neil Kilby and Don Lowe, to place first. Kilby and Lowe finished two, three. Orbit 7-14, ST .60, Midwest fuel. Jim Kirkland acted as chief judge for the pattern events. Walt Schoonard, CD. Photo by Art Schroeder.



Jackie Gardner's rudder only winner. Note the fantastic rudder size — throw on this barn door was pretty wild, too! Note the funnel used for pouring fuel . . . good way to kill grass! Beautiful job of flying considering the 20-30 MPH winds that plagued the King Orange. Photo by Art Schroeder.



Jim Kirkland carries his combination first place Goodyear and Scale winning entry to the flight line. Center: The winning flight. Right: Jim accepts the first place trophy. Photos by Hunt.





Part of the crowd that joined the contestants in braving the gale winds that haunted the 12th Annual event at Masters Field. Photo by Hunt.



The ready line. King Orange affair one of the first, and finest, of each year. Photo by Hunt.



Bill Welker accepts trophy for first place in Class II Expert. Bill, an outstanding contestant, flies G.G. from rooftops for relaxation. Photo by Hunt.



Jim Kirkland holding up pencil to make crossover of Cuban Eight. Neal Kilby and helper in background surveying competition.



Dave Holmes with the winning family of RCM Digitrio's, Delta Hustler, modified Falcon 56, and the hardware from the trials and tribulations of Miami wind. First in Class II Novice, Second AMA Open Pylon.



# TOP OUT

BY JERRY KLEINBURG



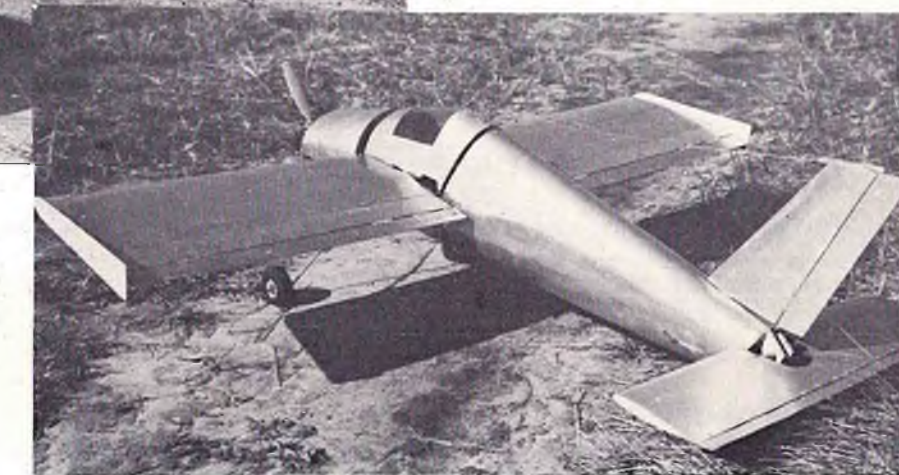
## CLASS I & FAI

**M**ILES REED, Nats class I 3rd placer, writes that class I at the Internats should give RC in the United States (and elsewhere) a real boost — if inclusion of rudder flying ever materializes. He contends the Canton, Ohio team would make it rough on all comers. Miles' spirit and interest is typical of many who not only consider RC aerobatics as an art, but are also concerned for solid growth and development of the sport.

Miles evidences a wise perspective however, with his "if" in the matter of class I and FAL. Here's why: It may now be reported that at the November meeting of the CIAM in Paris a vote of 13 to 2 was made to eliminate mono-control power RC from FAI sporting rules. Maynard Hill, our delegate, reports that the U. S. and Austrian attempt to retain the class did not receive CIAM support since other members felt there was little interest in single channel aerobatic competition in Europe. Maynard goes on:

"This is the grim reality of the situation and I'm sure it will seem incomprehensible to many in this country. It is sure to be a blow to enthusiasts for this category since it essentially removes a goal toward which they would like to work."

Maynard's letter continues, "But perhaps alternate goals can be set up. The only constructive suggestions I can think of, at the moment, would be that perhaps, since many of the single channel enthusiasts are inventive and curious, they could come up with a new



Two views of E. D. (Doc) Martin's all-metal creation. Space Control radio, Fox 59 tote 10-pound four-foot R/C flyer. Simple construction and excellent flying characteristics are tribute to Doc's inventive persistence.

category that is a technically interesting event requiring skills other than aerobatic flying. . . . Rather than just aerobatics, perhaps they could think in radical terms such as a weight lifting plane on a slalom course with ETA points and parachute spot-landing mixed together. This is just an example, not a well thought out suggestion. But I'm sure there are plenty of brains among single channel enthusiasts that could collectively come up with a really attractive event for such equipment and models."

The foregoing is being passed on at this point with no editorial comment in order to obtain your reactions to the CIAM action and comment to Maynard's suggestions. Also any ideas of your own — we'll print them all here. At this stage it's felt the discussion is developing some interesting aspects and deserves added views and voices.

## WITH THE FLYERS

\*The Houston RC club and the Space City RCers combined forces for a pre-Christmas fly-in which brought out some interesting entries. Leading attention getter was E. D. (Doc) Martin's all metal creation that must prove something for its simplicity and flying ability. Weighing 10 pounds (yes, ten!) the 4 footer (uh, huh — four's right) totes a 40 ounce/sq. ft. loading on a wing made of a couple aluminum tubes covered with .016 sheet aluminum. The fuselage, sporting a Fox 59, is also of .016 aluminum using stressed skin construction. It flies like the real ones, too! The plane is no first time fluke since Doc is Houston's leading RC innovator and perhaps could challenge many in pioneering RC firsts. His twin engine scale ships in 1957 drew much local notice and he's been lofting jet powered RC planes for almost four years now. His latest jet now being built features a built in CO<sub>2</sub> fire extinguisher that is activated if the ship's



radio fail safes! Doc claims he owns the most reworked Space Control in the country. Says it's been overhauled 27 times — now works like a charm in the metal ship!

Charley Hirsch was another contestant flying a well finished Falcon 56 using a C&S Digicon II. Charley runs Ace Hobbies in Houston and is recognized for his work in scale, especially when it comes to outstanding workmanship in paint jobs.

Turnout for the fly-in, Houston's only meet during 1965, was good with spirited flying. Jack Beauchamp, along with Jerry Heller, Ray Hewell and Ron Beard are working with the Greater Houston Modeling Council and Harris County officials to put final touches to plans for an outstanding model airport where meets will be held every two months.

Bob Moore of the Port Arthur OILY BIRDS, sends word of a fund raising flying demonstration in Beaumont that realized \$108 for Boys' Haven. This is Don Still's neck of the woods and this well-known stunt flyer helped out with a show of his artwork. Bob also reports a streamer cutting stunt was attempted by Jerry Burk and Bill Reynolds that didn't come off because Jerry's plane couldn't lift the roll of toilet tissue and crashed. Bob relates it was the first time they had heard of a plane being wiped out by toilet paper!

Chuck Morgan, the snowbound Flagstaff Mambo-ite says he's still flying his Special. Now it has -5° in the stab, a 3-wheel knock-off landing gear and a solid balsa covered wing. He reports the wing, since covering, is as sturdy as a brick shipyard and that he used the masking tape method to butt join the 1/4th sheeting. The tape holds the flat stock in place tight while glue is applied and dries. In 5 minutes Chuck puts 'er on the bench and starts working — it's that simple. He's using the Citizen-Ship propo for his class I creation — finds it a first class setup by using elevator for motor along with regular rudder control. Full proportional motor control results. This is how Chuck explains to do it:

"A simple mod does it. Open the transmitter and check the bottom of the elevator stick — there's a small 'L'

shaped rod engaging the neutralizing spring. Turn the 'L' 180° and the control becomes noncentering. On the front of the transmitter case mount a notched aluminum strip to engage the elevator (now, motor) stick so that the strip gives a ratchet control for motor." (Fig. 1)

Want to welcome on the RC scene the ALAMO RC SOCIETY (ARCS). Harry Pullin, Tom Valdez, and Mike Lucchese head the 20 flyer club who look to host many meets in the future in San Antonio. The club put down a nifty 36 x 300 foot macadem strip at their flying site — land made available through the cooperation of Dr. Jud Morrow, Director of the Southwest Agricultural Institute, and other officials of the Southwest Research Institute who are encouraging the hobby/sport for its technical as well as recreational advantages.

#### TECHNICAL BRIC-A-BRAC

- Have any broken center posts on otherwise good glo plugs? With a slight modification to your Kwik-Klip a solid contact is possible using the remaining nub of the center post. Simply drill a 1/16th dia. hole on the front lip of the plug clamp just ahead of the post dome. (Fig. 2) It won't affect normal use and if you have a flip-over which causes the soft post to pop off it won't be necessary to replace the plug. Incidentally, if the plastic clamp arms of your Kwik-Klip get broken — they get stepped on a lot — an ordinary wooden spring type clothes pin works real well as a substitute. Just fasten the Kwik-Klip hardware to it. . . .



FIG. 2

- Leaking plastic fuel bottles? Most fuel bottles have gotten away from screw caps and are using the more efficient plugs of plastic or rubber. Sometimes even these leak, especially after the stopper has been removed a few times. Using a new stopper (they're available at medical supply houses for a dime or so) and a 4-40 bolt and nut, the problem can be eliminated. (Fig. 3) All that's necessary is a light ex-

panding pressure to do an effective sealing job after the disc and nut and bolt are installed. And there's enough room for the 1/4th inch filler and vent tubes, too. Added benefit of the 1/4th inch phenolic disc — in installations where fuel bottles stick through firewalls — is to seal the firewall hole from exhaust oils.

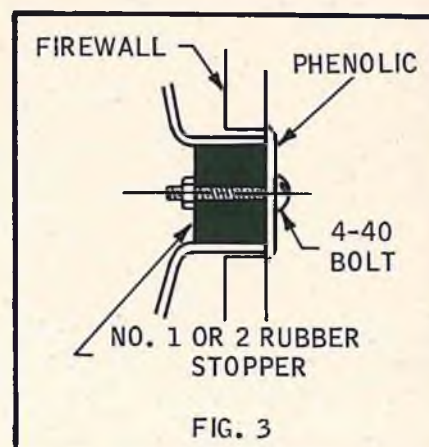


FIG. 3

- Rudderites, along with other RCers, will find the new Lakin nose gear marketed by Ace RC a useful addition to their ships. Designed and produced by Brian Lakin, the light yet rugged gear may be legalized for current class I rules using the system Gary Wedge suggested in the March 1965 TOP OUT. If the rules change — a recommendation to allow steerable control is being considered by the Contest Board now — you'll be prepared to take ready advantage of the increased maneuverability and safety of steerable nose gears. Another model of the Lakin gear for horizontal mounting a la Harrison Morgan's Hi Fin is being considered.

- While on the subject of nose gears, do you need a wheel that'll stand up to the landing rigors of class I? Combining the largest solid rubber Veco streamlined tire and the hub from a 2 1/2 inch Banner wheel results in the most serviceable item found so far. It'll take some stretching of the tire — I used a long-nosed pliers while Emily pressed the hub through — but once it's on it'll be permanent!

- Filling a long-standing need for RC, Sullivan fuel tanks (Pylon Brand) are now available in four different plastic shapes to suit varied installation needs of RCers. Round, cylindrical, and oval shapes, along with a special square middled 12 ounce, are being offered by the Willow Grove outfit. The 'round' type looks specially good to solve the limited length problem — it features a recessed filler neck which results in less aircraft space required for more fuel. The 16 ounce tank, for instance, is only 4 1/2" long and 3" in diameter! Rudder fans should find the 6 and 8 ounce sizes convenient.

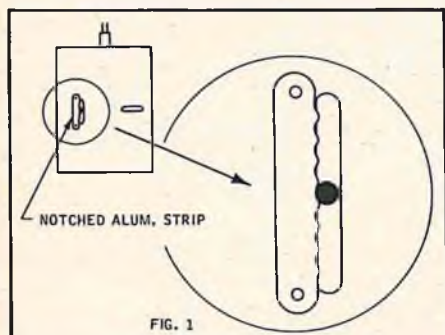


FIG. 1





Flattop Stormer gets needle from AF Captain Tom Hollarn at Brooke Army Medical Center demonstration. Harry Pullen, left, and Tom Valdez assist. Trio belong to Alamo R/C Society (ARCS), new San Antonio club.

### CONTEST TECHNIQUE

Having finished the 3 barrel rolls (RCM Mar. 1965) the next maneuver of the AMA pattern is the Immelman which begins the looping segment of the aerobatic phase. Right off, let's face it—class I aircraft cannot loop from a level start. At least not yet. For a long while, serious developers have attempted to solve the complex problem of finding the right combination of wing and power loading, aircraft design and decalage arrangement, thrust line angle, and the right wind and weather condition (humidity, temperature, pressure altitude, etc) that would make a flat start loop possible without sacrificing penetration, landing characteristics, level flight ability, and flat turn capability. Occasionally, a ship comes along that at times comes close, but to date an outstanding 'looper' is still the elusive goal of rudderites.

(One point—since RC aerobatics are intended to simulate full-scale aircraft

*maneuvers, why are the looping maneuvers of the AMA pattern made to start from level flight? Except for high performance military jets, looping of real aircraft requires at least a gentle dive to allow making a graceful looping maneuver. This inconsistency of course, points up the fact that RC aircraft have operating modes all their own and is an area that accounts for much of the judging confusion that exists today.)*

So, since excess speed is required, it's necessary to decide how to normally build up speed needed to kick the ship into a looping series. Incidentally, a properly trimmed contest ship must be capable of sustained looping once started—even in calm wind. If yours can't you'll be fighting a losing battle at contests. . . .

There are four ways to build up speed beyond what's possible with engine alone. From mildest to maximum speed, they are:

1. Oscillation—that is, chop throttle—dip—add power
2. Steep 180° turn
3. Slit S
4. Spiral Dive

Use the method needed to give excess speed but use the one that'll give it most reasonably. In other words, don't use no. 2 if no. 1 will do the job. The idea is to keep the desired pattern maneuver as simple and as uncluttered as possible—maximum scoring will be the payoff if it is. Having decided what method will be used as a 'kicker,' let's get on with the Immelman.

An Immelman is a climbing maneuver accomplished by doing a half inside loop finished off with a half-roll on top. Since it is done in a flat plane the easiest approach is to do it in line with the wind. After completing the three rolls—the ship is now slightly upwind and heading into the wind at about 75 feet—start a positioning climb that will give an additional 75 to 100 feet in a 360° turn. Having reached the desired altitude, level the ship for a few moments, call the maneuver then start the 'kick.' Using method no. 1, try to start in line with the wind as exactly as possible—the stronger the wind the more precise you'll want to be—and keep it that way as the throttle is cut, the dip starts, full throttle is shot in, and the ship heads upward and reflexes over. Just before the slowest speed is reached (the ship almost flat inverted) a right half-roll should be made using a double blip signal. A good execution of the Immelman is recognized by the plane coming out 180° from the starting direction, gaining maximum altitude, the half-roll on top being almost a point roll, and achieving minimum forward speed at the exit without dipping out.

### LAST THOUGHT

Ben Harr tells us the bowling group he's with adopted TOP OUT for their team's name. Wonder if he is installing receivers in the Brunswick 16 pounders they're using with surface antennas and servos to shift weights. Perhaps the Contest Board ought to look into this.

...



Bill McCormick and Balsa Box II. Ship is a rugged performer with .09 Cox power. Saw action at Houston, Texas fly-in.



Charley Hirsch, C.G. Falcon 56, and C&S Digicon II combined to compete in Houston Fly-In. Charley, a hobby shop dealer, feels service know-how comes best with field experience.



Leonard Hudson keeps close tab on son Alvin as the 7-year-old flyer negotiates a pattern at Lake Jackson contest. Little guy won R.O.I.



# KITS AND PIECES



**T**HE month just passed has been one of our busiest and with the least to show for our efforts. Even though this is the April issue, the months involved for us have been December and January. The holiday festivities cut heavily into our usual construction time, and as a result, we failed to maintain our normal pace.

It was intended that the Antic be completed and test flown before the publishing deadline. Unfortunately, we have fallen about a week short. The Antic, as kitted by Lou Proctor, has been one of the most interesting and enjoyable ships that we have had the pleasure of building. Although the Antic is of completely built-up construction, and appears to be a ship for only the expert builder, we believe that the **average** modeler can construct it and end up with that "special" ship that most of us dream of owning. The Antic is not a hard ship to build, although it is not a "buy-today-fly-tomorrow" pre-fab. The structure, which appears to

be flimsy in the photos, is extremely rugged, and will compare favorably with any R/C ship currently available — it's tough!

Our Antic has been completely covered and doped (clear only) and the equipment installed. Actually the ship is flyable, but we decided to wait until after the color trim was added. The color scheme recommended on the plans calls for an all-aluminum finish, similar to full-scale ships of this era. In our opinion, there is entirely too much structure and workmanship under the silk to have it hidden beneath several opaque layers of silver dope! Instead, we settled on orange silk for all of the flying surfaces, doped to a transparent finish using clear dope only. The covered and sheeted areas of the fuselage will be doped silver, while the open structure will be finished natural, with the engine mount and wing walks black.

The only possible difficulty in the construction of the Antic is in getting

the undercambered wing section covered without ending up with a flat bottomed section similar to a Clark Y airfoil. Silking an undercamber **can** be accomplished rather easily. The underside of the wing panel is covered in the usual manner, dopping the silk to the framework around its perimeter, starting at the root, stretching the silk moderately tight and dopping at the tip. The leading edge is now doped, followed by the trailing edge (do not over-tighten). Make an effort to keep the weave of the covering material running as straight as possible (this will help prevent twisting). If the silk has been applied wet, allow it to dry before continuing. If applied dry, wet and allow to dry. Now — lay the wing on a flat table and shim so that it rests solidly, underside up. Stack the covering with several copies of RCM (no pulp substitutes, please), making two stacks. Add weight in the center of each pile of magazines, until the covering is pressed firmly against the ribs. Leave one rib exposed between piles and dope the covering down, using a mixture of 50% dope and 50% Duco cement (add thinner as needed). The dope and cement are compatible in liquid form, however, once dry, the cement resists softening under subsequent coats of dope. After one rib has dried (about five minutes), move the magazines to another rib and repeat. Continue until all are securely doped. Weights alone can be used, although the magazines afford protection for the covering and help distribute the pressure.

In the open structure area of the fuselage we added small gusset plates at each framework junction. These are easily cut from  $\frac{1}{32}$ " plywood and add substantially to the strength, and we feel, to the appearance in this area.

(Continued on Page 46)

PCS control system installation. Ample space for any equipment.



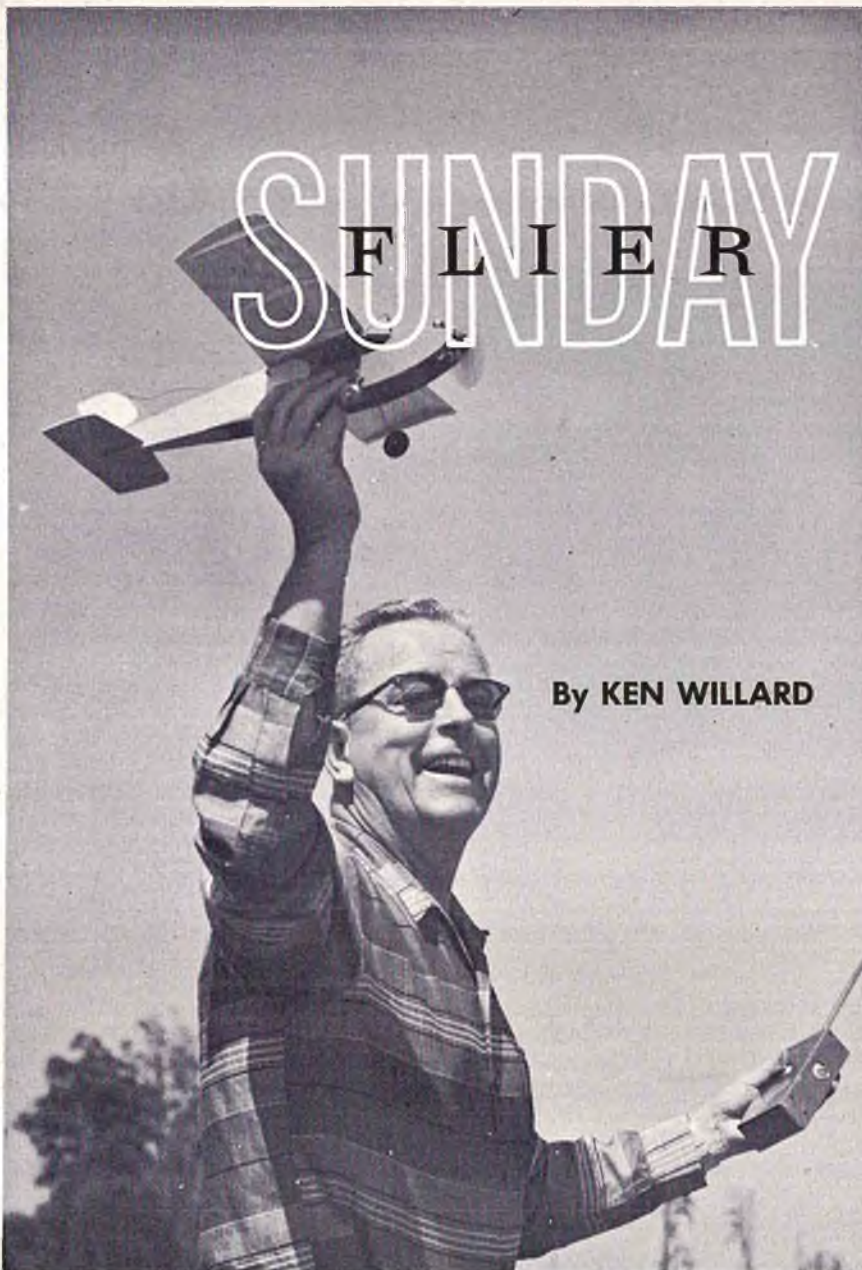
$\frac{1}{32}$ " ply gussets add strength as well as improving appearance.



The Antic, and a bout with the snow.







**Think You've Got Something New? Maybe.  
Let's Take a Look Through the Scrapbook of  
RCM's Chief Sunday Flier . . .**

**S**O here it is 1966, the bowl games have had more than the usual number of upsets, and it's time to figure out some plans for the coming year. Of course, you'll be reading this along about the first week in March, and maybe some trends will be well established by then. The Garden Grove Trade Show will be history, along with the Toledo Conference. Hopefully, they will turn up some new items to excite your fancy.

But what's likely to be new? Maybe a short look into the past might give a hint, so I went through some old pictures to refresh my memory. As I looked through them, it occurred to me

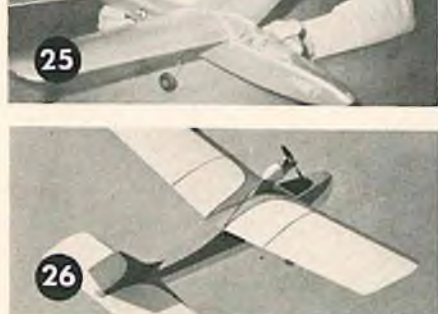
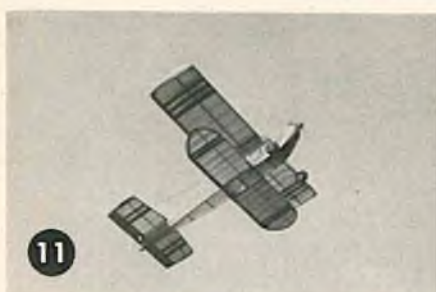
that you might be interested in seeing some of them, so I picked out a few.

Back in 1940 I was working at Parks Air College, and we had a lot of active modelers there. In addition, Charlie Schwartz, the instructor in radio, had some ideas about remote control of aircraft. So we teamed up with some students, and the result was my first attempt at radio control. The plane was an enlarged version of the CAVU — a free flight design that was quite successful. Because the radio was going to weigh about two and a half pounds, we built the model strong but

*(Continued on Page 48)*









## The BABCOCK BC-21 System

Complete  
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- The lowest priced interference-free single channel system on the market today.
- Provides selective rudder plus up-elevator from a single escapement.
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## KITS AND PIECES

(Continued from Page 43)

If they don't appear this month, we will promise flight shots in the next issue. Incidentally, since this is the season for bad weather, we intend to make the test hops in the front street! It's just too cold on the field!

Like the squirrel that stores his food for the winter, we have been stockpiling kits and equipment, some of which will undoubtedly find their way into "Kits and Pieces." Next month, we are going Galloping Ghosting. This equipment has been with us a long time, but unfortunately, has gained a reputation as "Mickey Mouse" and a tinkerer's delight. Hardly the thing for the man who wants to fly, and certainly not for the novice. Many fliers have enjoyed flying GG with great success, but still the seeming incompatibility of equipment and a lack of information and development has slowed its popularity. At last the R/C industry has noticed GG and has done something with it, making it practical, inexpensive, and reliable for the average RC'er. As I said, next month! For now, take a look at the preceding pages and see what our Fearless Leader and cronies have come up with — rooftop flying, yet! And on Galloping

Ghost!

I would like to clear up a point in the February column on the Kwik Fli II by Jensen Enterprises. Somewhere between my head and the printed page (you guess where!) the paragraph concerning the lapped wing spar construction became confusing. It was our intention to indicate that considerable effort had been used in the factory pre-tapering of the spars and doublers by the manufacturer, and that although we were hesitant to use the lapped spars as indicated in the instructions, it would have been a shame to waste their efforts by using a butt joint. Our hesitancy arose from our inability to visualize all of these parts fitting correctly. We **did** use the lapped spar construction and the spars **did** all fit together perfectly. If you are building the Kwik Fli, and any of the parts don't fit—friend, you've got the wrong piece!

I would like to add my thanks to NBC, and the sponsors of Sports in Action, for their job "well done" in presenting the 1965 Nationals to the TV public. Unfortunately, many cities chose not to run the show. Our local station subjected its viewers to the umpteenth showing of "The Thief of Bagdad," hardly a worthy replacement! The real prop twister was the attitude of the station when scores of RC'ers

called to complain. Baltimore RC'ers are now watching NBC via the Washington station!

A big "welcome aboard" to the DCRC, one of this country's oldest and largest R/C clubs. At the December meeting it was voted to become 100% AMA! Most of the smaller, less prominent groups have recognized the advantages of 100% AMA support for years.

Several new products have reached us during the past month. The new low bounce wheels from DuBro Products should be a must for every RC'er. These wheels are virtually bounceless, making smoother takeoffs and landings a snap. These new units are identical in appearance to the familiar standard DuBro wheel, with the exception of a molded-in name on the tires (also available in slicks).

Also from DuBro is a new electric brake, featuring a larger drum diameter and thinner profile. These brakes provide effective stopping action on a .61 powered multi ship at 2.4 v, and can be used at higher voltages if desired. Electric brakes offer several advantages over mechanical braking. Among these are smoother, more even operation, with no possibility of grabbing or locking up. A simple Micro switch is the only actuator needed, with no mechanical lines



# NEW

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BUBBLE CANOPY .98c 10"

Coming Soon "La Jollita" Goodyear Racer

HEADREST CANOPY .79c

required. Along these lines, we understand EK Products has a small printed circuit board with necessary circuitry for varying the voltage to electric brakes, thus giving proportional braking!

We also received one of the new F&M Digital servos. This new unit is now being shipped with all F&M proportional rigs, in lieu of the Digimite servos previously used. The new F&M servo is one of the finest that we have seen, both electronically and mechanically. It is one of the smoothest and quietest servos yet, being almost silent in operation. The servo is compact and features linear push-pull output. The addition of the F&M built servo to the already top-rated F&M system is evidence of the manufacturer's continuing effort to provide the most reliable equipment possible.

Rand Manufacturing Co., 8909 Hubbell Ave., Detroit, Michigan announced a new series of pulse proportional actuators for use with single channel equipment. Three models are available, one for rudder only (HR-1) at \$15.95, one for rudder and motor (HR-2) at \$17.95, and one for rudder, elevator, and motor (Gallop Ghost Model LR-3) at \$19.95. These servos are small (1" x 1 1/4" x 2") and lightweight (1.5 ounces). We have used the LR-3 model

with both the Min-X Pulsemite system and the Controlaire SH-100 receiver and CG transmitter with complete compatibility. The Rand actuators all feature direct push-pull operation, with no torque rods or fancy birdcages out at the tail. We highly recommend these new products from Rand — powerful enough for a .35 powered ship!

Action Industries, Inc., 4125 Reisters-town Road, Baltimore, Maryland, is currently delivering their new fiberglass Aeolus fuselage. This is a well made fiberglass version of Dick Riggs' beautiful pylon racer featured in the May 1965 issue of RCM. Action's fuselage is deep formed, with the only seam along the lower edge where the bottom is installed. There is no joint along the top center of the fuselage. The fuselage comes complete with impact molded cheek cowls and wheel pants and full size plans — \$28.50.

Action Industries is also marketing "Sky Riter" cartridges. These new smoke bombs provide four to five minutes of dense white smoke. The cartridges have been tested and found to be completely safe. They are also mailable. The cartridges are priced at \$1.29 with a holder available at \$1.95. Try one of these for a spectacular flight!

Ace R/C has come up with a delrin wheel hub for use with their electric

brakes. These new hubs allow the brakes to mount internally in the wheel, requiring no additional axle length. These will prove advantageous on many ships which come with landing gears just long enough for the wheels, in addition to making the brake installation practically invisible.

Kits and Pieces is your column. We try our best to give an honest description of the kits and equipment under examination. At best, we can give only our opinion — based on a single unit. Do our conclusions agree with your experiences? If you feel that we are off on our opinions of a given kit, please let us know. We'd like to hear from you if you agree, too. How about it? A postcard will do. Send them to Bernie Murphy, Kits and Pieces, 454 Gayle Drive, Linthicum, Maryland.

Don't forget the DCRC Symposium, May 14 and 15, to be held at the John Hopkins Applied Physics Lab, on Route 29 between Washington and Baltimore. If you can possibly fit it into your schedule, plan to do so. This is your chance to meet many of the personalities behind the R/C industry and learn a little first hand about R/C.

I hope by now the weather has turned favorable, so until next month — see you at the field!



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for radio control

## SUNDAY FLIER

(Continued from Page 44)

light, as you can see. Man, I'd never do that again! Too much work. But the result was very gratifying. We used the NACA 6512 section, a high lift undercamber airfoil, and the model, without radio, weighed about four and a half pounds. The Brown engine flew the model free flight very well, carrying a dummy load of two and a half pounds — and when we went to install the radio, we did just as well with the dummy load — beautiful free flights! But at least we tried! I have to admit I kinda lost interest for a while though. About 12 years.

Along about 1952, after several post World War II years of free flight designs, I got the urge again from watching Dick Schumacher, Howard Bonner, Webb Hill and some of the other oldtimers. So I bought a Citizenship rig — the one on 365 mc. I had a nice four foot free flight design, called "Stubby" because of its low aspect ratio and short moment. I installed the radio, and Dick Schumacher flight tested it for me, then let me fly it. But whenever the nose started down in a turn, he'd say "Watch out!" I didn't know why, for sure, because I figured opposite rudder

would always make the recovery.

Picture No. 2 shows Stubby. Looks all right, doesn't it? But a few days after I'd soloed it, I tried to spiral it down from altitude, and succeeded — all the way, while frantically trying to pull it out with opposite rudder. End of Stubby.

Next came Scraps — made from an old free flight wing and stab, with a quicky box fuselage. Nice flier — so long as the nose didn't get too far down in a turn. But it did. End of Scraps. All I've got left is picture No. 3.

So I tried once more — this time with Sharpie. Picture No. 4 shows the free flight and the radio controlled version. My old sidekick Bill Glick built the radio job. A beauty, too. And after a few good flights, another spiral dive. Hm-m-m. This radio bit was getting monotonous. So I decided to think about it for a while, rather than just try to put radio in a free flight.

I finally figured that what happens is that with the radio you can get an airplane into a high speed force arrangement that it can't get into as a well adjusted free flight, so it becomes a maladjusted free flight and proceeds to act like one — but only once.

Up until this time (around 1954) we only had rudder control. Then we added the "kickup" elevator, and things got better. Now you could pull out of

those spirals with elevator and rudder. I designed "Bussboy" to experiment with spiral dives, and it turned out to be a very good basic R/C cabin job. Picture No. 5 gives you the general appearance. It had a BCR-3 receiver — some of you may remember that one — it was the best of its time, as long as you didn't have one with a "singing" 3A5 tube! If you did, you really had to mount it absolutely vibration free — and that was pretty tough, so we used to pick them carefully. The 3A5s, I mean.

Even in those days flying sites were hard to come by. That, combined with my interest in flying boats, led to "Dreamboat." With this model, shown in Picture No. 6, with a launch shot Picture No. 7, I really revived my interest in flying off the water, because it's very seldom that a lake is converted into a housing development — although I've heard that some real estate deals have been made where a swamp was sold as a "well watered golfing site."

I even gave some thought to a twin hulled job. Some years before I built a little Infant powered seaplane, shown in Picture No. 8. I decided not to fight the linkage problem, but it's still not a bad idea. Great water stability.

Biplanes have always been intriguing from a design standpoint, and R/C gives you a lot of leeway. Picture No. 9

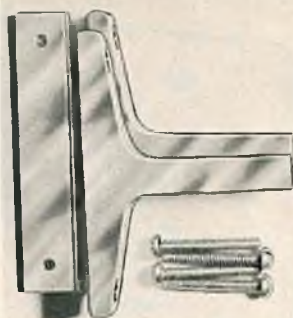


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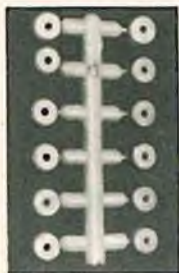
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C-4  
Fu-Seal - Fuel proof, adhesive back seal. Pkg. - .50



C-5  
No-Noise Nylon Builder Accessory Kit - all nylon parts. Pkg. - .60



C-11  
Spring Wire Nose Gear Pkg. - .75

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shows the Duranita, a free flight that I converted with the pickup elevator installed. This was a 1954 design - and I'm still flying the model shown in the photo, although I've recovered it with new silk recently.

Then there was Scraps (Mk. II), (Picture No. 10), which won some hardware; Breezy, a biplane designed for the McCoy .049 diesel, shown in Picture No. 11, was a very successful design, after a couple of variations were tried, as shown in picture No. 12.

Finally, during the time period (1955-58), Cox came out with the reed valve version of the .020 - a real powerhouse for its time, and I built the "Trojan." I was working at the University of Southern California at the time. Picture No. 13 is one of my all time favorites; it shows a guy dressed like a businessman relaxing at lunchtime with his little R/C biplane. Now, some nine years later, I still like to get away for a few minutes at lunch and put in a couple of flights. And I figure to be doing it for many years to come, God willing.

During this same time period I was also busy with various monoplane designs. Perhaps the most famous is "Breathless" - so named because that's the way it left you after a good perfor-

(Continued on Page 51)

## R/C FLYING SAFETY

(Continued from Page 32)

These are crash causes and crash investigation.

### Crash Causes

Any prevention system can list literally hundreds of reasons why planes crash. Whenever the radio controlled model becomes airborne the operator intrudes in a somewhat unnatural environment. The safety of the plane, then, is dependent on the proper functioning and the capabilities of the human operator as well as the mechanical/electronic reliability of the aircraft itself. A malfunction of either or both may result in a crash.

With these thoughts in mind it is possible to consolidate crash causes under two broad headings: Personal Error and System Failure.

### Personal Error

Personal Error accounts for "pilot error"-caused crashes during the flight phase and those omissions, or commissions, that generally occur during some period prior to flight. Personal Error thus warrants a further breakdown into two subheadings: Before Flight and During Flight.

Let us first consider Personal Error During Flight. Its spectacular results certainly deserve prime consideration.

In its simplest definition, Personal Error During Flight means that the operator made a mistake while guiding his plane. The reasons for the mistake are as varied as the differences among individuals. Some of these crash causes are listed in the box below. One arbitrary point: "During Flight" is considered to be the period from immediately before commencing the taxi run, or starting the hand launch, to the time the flight is terminated - that is, taxi back completed or model definitely at rest on the ground with the engine stopped.

### Personal Error During Flight

1. Transmitter antenna not fully extended. Transmitter detuned; loss of range.
2. Failure to check all control movements prior to takeoff or hand launch. Switches off; controls reversed; intermittent control; controls binding; controls hanging up.
3. Engine set too lean. Sagging during or immediately after takeoff/hand launch.
4. Takeoff/hand launch not into wind, if possible. Swerve; lifting of one wing; ground loop.
5. Model hauled off runway with insufficient flying speed.

(Continued on Page 50)



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SPAN AND UP TO .19 ENGINE  
DESIGNED BY DICK JANSSON  
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- 5. NO INVESTMENT LOSS!** Your Command Master is a basic R/C building block. Additional factory-installed controls (elevator, aileron, etc.) may be added to match your advancing flying ability.
- 6. NO EXPENSIVE "EXTRAS" TO BUY!** This receiving unit is truly complete. It even includes built-in rechargeable Nicad batteries and the charger. Just plug it in the night before—and fly!
- 7. GUARANTEED FOR 5 YEARS EVEN IF IT CRASHES.** No more big repair bills! No more lost flying time! Immediate replacement will be made on receipt of the unit at the factory with \$7.50 provided the lid is not removed and unauthorized repairs are not attempted.

## R/C FLYING SAFETY

(Continued from Page 49)

6. Zoom after takeoff. Loss of air-speed; stall; falling off on one wing into ground.
7. Steep turn after takeoff. Loss of airspeed; loss of altitude.
8. Inattention. Failure to keep sight of model at all times; model allowed to fly out of reliable range.
9. Fascination. So intense in attention to flight of model that surroundings, including terra firma, are disregarded.
10. Structural failure. Pilot-signaled control movement that causes abrupt change in angle of attack resulting in excessive "G" load and failure of wing or horizontal stabilizer.
11. Inexperience. Turns in wrong direction; excessive bank angles; incorrect elevator signals; panic.
12. Model allowed to get beyond safe dead stick gliding distance of landing area.
13. Flathatting. Low level stunting; overzealous attempt to impress the crowd; showing off.
14. Steep turn during approach for landing.

15. Landing approach too steep — no landing flare.
16. Landing approach too shallow — stall on final.
17. Bounce landing.
18. Undershoot or overshoot of the landing area.

You probably can add many more of your own.

That "Fascination" cause sounds intriguing, doesn't it? Here is an actual case. A few years ago my six-channel, flat-bottom-airfoiled deBolt Champion flew into the ground while in a shallow, inverted descent. I was so enthralled with flying upside down that the plane was about 30 feet off the ground before it became apparent what was happening. Couldn't roll out — no ailerons; couldn't pull through — not enough altitude; couldn't outside loop — no down elevator left. The Champ made a beautiful arrival — upside down.

Personal Error Before Flight takes in all those non-flight processes that are essential to successful R/C operations. Errors in this phase may span the gap from the time construction commences to the actual pre-flight procedures on the local flight line. As far as your "fly safe — save the plane" program is concerned, this area may indeed be the

most critical. It is here that the R/C machine may crash **even before it takes off!** It is in this phase that lack of knowledge or appreciation of the laws of aerodynamics generally occurs. The pay-off, in destruction, is manifested once the model is airborne.

Our second box will mention some of these crash causes.

### Personal Error Before Flight Construction Phase

- 1. Materials selection.** Wing/horizontal stabilizer spars of too light a density to carry the load; structure too light to guarantee engine power transmission without vibration; construction too heavy aft of wing.
- 2. Workmanship.** Weak joints; misaligned fuselage or vertical or horizontal stabilizer; incorrect engine thrust line positioning; vertical and horizontal stabilizers not at right angles to each other.
- 3. Equipment installation.** Incorrect placement of fuel tank, batteries, receiver, servos, switches, or connectors; inadequate hinging of control surfaces; linkages binding; receiver mounting too firm; batteries not firmly secured.

(Continued on Page 52)



mance. Picture No. 14 shows the original. It was powered by a McCoy .049 diesel, used various gas tube receivers of the time, and is still a fundamentally sound design for rudder only sport flying.

But the enlarged version—"Big Breathless"—really hit the headlines. In 1957, after four previous attempts with "Avalon Dreamboat," an enlarged version of the original, the first successful flight from the mainland to the island of Catalina was completed by Big Breathless. In doing so, an unofficial distance record for R/C was also set. Picture No. 15 shows the model with the K & B .15 used for the channel flight, and with the test landing gear, which was removed for the over water flight. Picture No. 16 shows Bill Glick and me with Big Breathless immediately after setting a new world's endurance record. Note the stub wing on the bottom of the fuselage. The FAI rules only permitted a 16 oz. wing loading then (now it's around 24 oz., and you no longer have to take off from the ground).

Picture No. 17 shows Paul Garber, who runs the Air Museum of the Smithsonian Institution, accepting Big Breathless for permanent display, after the model held the endurance record for five years before being overtaken by advancing science.

There were the usual fun models during this time too. The Traveler, in Picture No. 18, had a folding wing, and I used to take it with me on business trips when I knew I'd be seeing some of my friends during the off hours.

Picture No. 19 shows a converted U-control model, the Brave, which was a real hot performer. It came to an untimely end at a LARKS circus, when I was flying it with two streamers tied to each wing tip—and one of them let go. The drag of the other one, combined with some attempted control, resulted in one of the most spectacular asphalt splatters ever recorded at Mile Square Airport!

While all this was going on, I kept watching the contests, and entering a few, but in 1959 the temptation was too strong. I'd designed the Gasser for pylon racing, found it to be a good smooth aerobatic job, and decided to show that the old "intermediate" class could do a good job of competitive flying. Picture No. 20 shows the "Honcho Gasser," a .15 Max powered version, which won the intermediate class at the '59 Nats. Variations of that design are still flying and winning contests even with the revised classes.

After 1960, when I moved up here to

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the San Francisco area, I became a real member of the Sunday flier clan. Contest flying under the new rules left me cold. I had an idea that semi-scale racing might be interesting and designed the "Scorcher," a 1/2A pylon racer with certain cross section area requirements. Picture No. 21 shows the original. The design was well received, but the idea didn't go over. Jerry Nelson revived it recently with his .40 powered Goodyear event, but we seem to get back to the basic desire of the average modeler just to have a good flying but attractive model, and he couldn't care less about competing with it.

And that brings up another type of model—the scale job. Over the years they've always been popular, and with the advent of radio control they are even more practical. My personal preference is for the smaller size models, but in any size, scale is always a challenge. Picture No. 22 shows some favorites, and Picture No. 23 is a scale biplane of an original design by a friend of mine who had an unusual idea.

The .010 engine led to some ultra small designs—until its real power potential became apparent. The Pageboy was a 15" model (Picture No. 24) which I clipped to an 8" span for the smallest R/C yet. Then I tried a pusher (Picture No. 25), another flying boat, the Hydrohoney (Picture No. 26), a low wing job (Pic. No. 27), and, of

course, a twin engine design, the Double Feature, which had several variations. Picture No. 28 shows the tractor version.

Well, those are a few of the designs from over the years. High wings, low wings, biplanes, shoulder wings, flying boats, scale jobs. So what's new? Nothing, really. Except that the means for controlling the designs has made giant strides, and you can design almost any model you want, and if it can fly at all, you have the means to control it.

Oh yes, there's another field where some significant advances are coming up, and that is in the use of new materials for models. Foam cores, plastic molds, and other construction methods will become more prevalent.

Come to think of it, there are some new frequencies under consideration, too. So, once again, what's new? Everything, so long as you understand that it's not really new—just a continuing improvement in the use of what's available and waiting to be adapted for our use. And that's what keeps this sport so dynamic.

Now it's your turn to send me some of your historical pictures. Don't forget, I edit this column, and write it when necessary, but it's for all you Sunday fliers who have an item you'd like to share with the modeling fraternity. So send it in.

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## R/C FLYING SAFETY

(Continued from Page 50)

### Before Flight Phase

1. Failure to check rigging. Warps in fixed surfaces; wing tilted; misalignment of surface incidence angles; too little or too much throw on moveable surfaces; misalignment of engine thrust lines; center of gravity too far forward or too far aft (generally the latter).

### Ready for Flight Phase

1. Equipment and accessories. Batteries not charged; marginal radio tuning; engine not broken in; engine not run at various speeds to check for vibration; loose engine mounting bolts; control surfaces hooked up backwards; shifting neutral position of control surfaces; sluggish servo operation; nicked or insufficient wing holddown rubber bands.

Two of the most dramatic examples of an aircraft "crashing before takeoff" are etched in my memory.

One incident occurred in 1960 with my very first multi equipment. Logic indicated that since the rudder lever went right for the rudder to go right,

the elevator lever should go toward the bottom of the transmitter for the elevator to go down. Whenever the plane was in a tight spot it invariably would point its nose toward terra firma after receiving a signal. This was particularly disconcerting when the landing flare was even slightly delayed. Instinct was too strong, for at these moments I was hauling back on the stick (toward the bottom of the transmitter) to get the nose up. The signal being sent to the model, however, commanded down elevator. It took only a very few of these "follow the bouncing ball" flights to indicate that a reversal of servo leads was in order.

The second incident happened but a brief time ago. The testing of a Class III machine belonging to a former friend resulted in a smooth takeoff, a slight right turn, a pulsed left aileron signal, a steepened right turn, and a cartwheel. The ailerons were reversed. They had flopped around fine before we taxied out, but it was my error for not double checking the direction of movement.

This is the type of crash we can do something about, but the action must be initiated **before**, not after, the accident.

Part II will discuss crash causes attributed to System Failure and a method of analyzing such causes.

## WOLFMEISTER LR-3

(Continued from Page 30)

feet away. The Wolfmeister looked like a prehistoric monster thrashing out its life in the ice plant!

After trimming down the elevators to that shown on the plans, plus reducing the throw and adding some additional right thrust, we purchased a compatible transmitter — the new Controlaire Galloping Ghost unit that utilizes a Bonner stick assembly for the prime control functions, and a reed lever switch for throttle control. From this point on, flying the Wolfmeister was sheer fun. The Rand LR-3 performed perfectly, and it was truly "Gallopless Ghost." Control was precise, and instantaneous. Throttle control was excellent. The ship responded perfectly, and for all intents and purposes, was like flying one of the bigger, feedback systems. I, personally, can recommend and endorse this entire system as an economical method of obtaining proportional control of rudder,





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elevator, and motor, with coupled ailerons as an added bonus, if you so desire. Considering the size and weight factor, the compatibility and performance of this system, and this excellent new actuator, a whole new era is about to open for the sport flier.

The Wolfmeister is a simple airplane to build. The wing is strictly conventional in every sense of the word. The scallops, if desired, are scribed with a compass and then cut out, but only after all silkspan and dope is applied. The cabane structure is simply four pieces of  $\frac{3}{32}$ " diameter aluminum tubing, epoxied to the wing center section and bolted together at the top. The rigging wires are lengths of dacron line terminated at cut-off straight pins cemented into the wing leading and trailing edges. The pilot is a standard Williams Bros. unit. The cockpit coaming is a piece of fuel line cemented down with HobbyPox glue and then painted black. No color was used except for the painted black crosses, outlined in white, and the red strip down the center of the wing to cover up the Celastic reinforcement in the center section.

The fuselage is a  $\frac{3}{32}$ " balsa "box" with  $\frac{1}{32}$ " ply doublers contact cemented in place from the firewall back to a line even with the trailing edge of the wing. The empennage is also of solid sheet construction. No covering material was

used and only several coats of clear dope was used for a finish. The tank compartment cover is somewhat unique, inasmuch as it is simply a piece of manila file folder stock which has one coat of fibreglass resin applied to each side. It was then lightly sanded to remove any runs, and held in place on the fuselage with six small sheet metal screws. A small metal clunk tank was used in the compartment itself. The landing gear is bent from  $\frac{3}{32}$ " music wire and held in place with four nylon hold-down clips and 2-56 nuts and bolts. Wheels are standard Williams Bros. unit.

As mentioned, the engine is a Cox Medallion .09 with throttle. Prop used was a Rev-Up 7-4. C.G. for the Wolfmeister should be at the leading edge of the main spar.

If you haven't tried Galloping Ghost, or dual proportional control, you might want to start with the Wolfmeister. The equipment is completely reliable and needs none of the tinkering that has previously been associated with this type of control system. It is a lot of control for the money, and far more than the single channel flier has had available in the past.

There is no doubt about the equipment. Only the ability and the sanity of the designer of this model is in question.

## PIPSQUEAK

(Continued from Page 28)

panel, taking care not to sand in any sweepback (or sweep forward). This operation is best performed by placing each wing half on a wooden board with the center rib flush with the edge of the board. Prop the tip rib up  $1\frac{1}{8}$ " to get the proper angle, and then sand along the edge of the board with a flat sanding block until the center rib has a smooth, true angle along its entire length. After both halves of the wing have been sanded, trial fit them together to test for correct dihedral and a good fit with each other. Proceed slowly during this step, as much of the wing strength at the center depends on a good fit at this joint. When the two panels fit, they should be cemented together. This joint should be pre-glued - that is, put a thin coat of glue on each rib and let dry, then put on a second coat and join together. The wing

(Continued on Page 54)



## PIPSQUEAK

(Continued from Page 53)

should be pinned with one panel flat on a work-board and the other tip propped up  $2\frac{1}{4}$ " until dry. Now, cut  $\frac{1}{16}$ " off of each end of the center ribs and cement the leading and trailing edge braces in place.

The top planking may now be applied as well as cementing the tip blocks in place. When all is dry, remove the wing from the work surface and give all accessible joints a second

coat of cement. The leading edge and tip blocks may now be carved to rough shape and the entire wing structure sanded to a smooth shape. The wing should be given two coats of clear dope, sanding lightly between coats to remove any fuzz.

The wing is covered with colored Japanese tissue. The bottom surface first, using the tissue dry. Attach to wing perimeter framework with thick, clear dope. When the entire wing is covered, spray with a light mist of water from a Windex bottle or similar type sprayer in order to remove all wrinkles.

When the water has dried, the wing may be doped with thin, clear dope — about six coats will give a nice finish. Avoid the use of color dope as the weight-building factor will be excessive. The wing should now be set aside to cure while construction of the rest of the model commences.

Begin the fuselage by cutting the sides, bulkheads, firewall, and  $\frac{1}{4}$ " square tail post to size. This is a good time to put the blind mounting nuts in the firewall, and sand the top and bottom taper to the angle indicated. The nose doublers and cabin framing should be cut to size. Cement the doublers to the fuselage sides, being certain to make one left and one right side. Contact cement is excellent for this operation — I use Weldwood. Cement all of the framing to each side. If an escapement is being used, it should be mounted on bulkhead F2 at this point. Use small scraps of  $\frac{1}{32}$ " plywood where the mounting screws bear against the balsa bulkhead, and glue a scrap of this to the front side of the bulkhead where the torque rod will pass through. This piece of plywood may be used as the torque rod bearing by punching a small hole in it with a pin.

If the model is being built for Galloping Ghost, simply drill a hole in F2 to clear the torque rod. Bulkheads F1 and F2 may now be glued to the fuselage sides, pre-cementing all joints. The fuselage should be allowed to dry, checking constantly for proper alignment.

When dry, the sides should be pulled together at the rear and the tail post glued in place. The firewall may be installed, using a good epoxy glue such as HobbyPoxy. If the model is being built for escapement flying, this is the time to install the torque rod and rubber motor. A very satisfactory torque rod can be made from  $\frac{1}{32}$ " wire. Splice it in the middle with a scrap of brass tubing — this makes bending of the ends much easier. A small eyelet makes a good bearing at the tail post. Use the same location for escapement or GG.

The stabilizer should now be cut to shape and cemented in the two slots in the fuselage sides. If the model is being built for dual proportional, cut the elevators free and hinge them. I prefer clot hinges, but whatever you use, keep it free from any stiffness or binding. When the stabilizer is glued in place, be certain that it will line up well with the wing when viewed from the front and is square with the fuselage.

Plank the bottom of the fuselage, using  $\frac{1}{32}$ " plywood from the firewall back to the point indicated, and  $\frac{1}{32}$ " balsa for the remainder. The grain in the balsa planking should always run across the fuselage, top and bottom. If the model is being built for GG, this is

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the time to install the actuator and torque rod. The actuator should be glued in place on a pad of  $\frac{1}{8}$ " foam. (Dr. Scholl's brand, available in all drug stores.) Bend the torque rod to shape from  $\frac{1}{32}$ " music wire — be careful to get the correct shape from the side view. Use a small eyelet in the tail post for a bearing and solder into the  $\frac{1}{16}$ " O.D. tubing shaft on the actuator. Be careful to get a good alignment between the crank on the torque rod and the centering pin on the large gear of the actuator. When satisfied that all is free and working well, the top may be planked with  $\frac{1}{32}$ " balsa. Plank the area from the firewall to the cabin bulkhead also (don't forget those blind mounting nuts!). The front and rear cabin fairing blocks should be carved and hollowed from soft balsa and cemented in place.

At this time the entire fuselage should be sanded smooth and the corners rounded slightly. Make the fin and rudder from  $\frac{1}{16}$ " balsa, noting the grain direction on the fin and dorsal. Hinge the rudder and make certain that it is quite free, then sand this assembly smooth. The fin should be glued on with some cement that does not shrink. I feel that HobbyPoxy is superior here.

Install the strip of  $\frac{1}{32}$ " plywood that serves as a stop for the landing gear and temporarily mount engine in place. An extension for the needle valve will have to be made and the fuselage side notched to clear it. Take the engine off and put it back in its dust free box.

The fuselage and tail should be given three coats of thin butyrate sanding sealer (I use Aero-Gloss), sanding well after each coat with 400 paper. The stab may be covered with Japanese tissue to match the wing, using the same technique of doping it down around the edges, then lightly water

(Continued on Page 58)

## RETURN OF THE GHOST

(Continued from Page 24)

sary. For receivers, we used the Controlaire SH-100 superhet single and the matching Min-X 800 or 1200, depending upon which system you choose. For actuators, we eliminated all but the Rand LR-3 Galloping Ghost unit and the Tomoser GC unit. At this point, we have the three basic items involved in the system — transmitter-pulser, superhet receiver, and actuator. Where are we cost-wise? With the Min-X system and either actuator, the total cost is \$120. With the Controlaire system, \$130.

We'll take this simplification a bit further and add a Controlaire NND switcher for \$2.98. Both of these actuators require a 2.4 to 3.75 volt power supply on either side of the motor.

By utilizing this simple little switcher, only one supply is needed — such as two nicads (180 Mah to 600 Mah), two alkaline energizers or three nicads, depending upon the size of your airplane and the power required by the servo. With the Controlaire receiver, we used all combinations of batteries and found them to work quite well, using the same actuator supply for the receiver. One of the photos with this article shows an .020 size airplane designed by the author which included the SH-100 receiver, Tomoser actuator and switcher, plus three nicads. Total system weight was 5 ounces!

A word or three about the actuators, themselves, is in order. The Rand LR-3 is a very powerful unit that provides proportional rudder and elevator, plus positionable motor. Power transfer to the surfaces is by two standard pushrods. Throttle linkage is the standard pushrod or Teflon tube and cable. Power is adequate for any size within the range stated in our requirements. Upon loss of signal, the Rand unit will provide neutral rudder and elevator and low motor. The Tomoser actuator is designed for smaller aircraft, approxi-

(Continued on Page 56)

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RCM Editor with original design, Gigi, and Tomoser actuator.



Tomoser GG actuator inside Gigi.

## RETURN OF THE GHOST

(Continued from Page 55)

mately .020 to .09, and does not have a throttle arm. There is no fail-safe feature. If you should lose signal you will receive a full up and full left control. By the same token, the full "on" and full "off" buttons on the Min-X transmitter, or the throttle lever on the Controlaire transmitter, can be used to provide an automatic left or right spin with this actuator.

Now that we have the system, what can we expect from it? First of all, unlike a "full-house" system, the control surfaces are "flapping" all the time. In the neutral position, they are "flapping" equally left and right and up and down, giving a smooth forward flight. As the control stick is moved toward the down position, the rate is increased and the elevator gives a "down" proportionate to the amount of stick movement at the transmitter. You will note that the "flapping" movement was stepped up to such a degree that in full down it is almost motionless, due to the increased pulse rate. In the "up" position, the rate decreases, and the flapping is much slower and more pronounced. In flight, however, this thrashing about is not noticeable, and control response is quite smooth. By varying the width of the pulses, that is, moving the stick left or

right, the rudder responds with a proportionate amount of left or right rudder. Throttle is accomplished by either buttons (Min-X) or a reed lever (Controlaire) which signals a full "on" or full "off" signal. The throttle will move toward the high (full on) or low (full off) position as long as you hold the button or lever depressed, giving trimmable throttle control. During this period of time, the servomechanism is "going around," that is, the surfaces are rotating through their complete cycle, giving in effect, neutral control at the rudder and elevator.

Very simply, this is proportional control via a single channel system. At first glance, it may appear to be a giant threshing machine at work, but in flight, it is excellent and precise. It is not a full-house proportional system with independent control of each flight surface, but it is proportional control, and will give the average flyer many hundreds of hours of proportional flying with a minimum of expenditure. And it is, now, reliable — thanks to the efforts of these manufacturers. And, for the average flyer, the system will provide more potential than he can reach for quite some time. As an example, we have seen almost the entire Class II pattern performed with a Galloping Ghost system in a C.G. Junior Falcon — complete with consecutive touch and go's!

Just a hint or two — keep your pitch

axis (elevator) surfaces small, chord-wise, and keep the control surface throw down until you are familiar with the flight characteristics of your system and individual model. Use DuBro adjustable Kwik Links at the surfaces so that you can adjust the throw as desired.

You'll like simple proportional. We predict that in the coming months the sale of this type of equipment will reach an all-time high and outsell all other forms of R/C equipment, insofar as new equipment sales are concerned. New actuators will make their debut. We also expect to see a full feedback proportional rudder and elevator, plus trimmable motor system in the miniature — somewhere around 5 or 6 ounces all up weight.

You can also expect to see a new class of Sunday flier competition develop — Goodyear type pylon racing limited to single channel control systems with a maximum engine displacement of .10. These racers will not necessarily be scale, but will be identifiable as Goodyear racers. There will be no weight restrictions, but the minimum wing area will be 320 square inches. This will be a whole new field for the sport flier with the new, reliable Galloping Ghost equipment.

Has it been tried? Yep. As a matter of fact, Frank Garcher (Midwest Products) has challenged us to a race, after trying this new event. He bet a bottle of Tequila (imported, complete with worm) against a bowl of anchovy olives floating in Beefeater's Gin that he could whip us two out of three.

Not a chance. He's overlooked the power of the press. RCM is hereby offering a \$50 prize, in addition to the regular publication rates, for the first design for this new category, accepted for publication. Read the specs listed above, build it up, draw out the plans, write a short article, send some pics . . . and above all . . .

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## GRUMMAN GULFHAWK

(Continued from Page 22)

three side by side and one in the top wing. Balance point is 50% of the top wing chord.

### Painting and Covering

I used red Silron (Royal Products) on the wings, applying three coats of AeroGloss clear, soft sanding after each. The body is painted directly over the wood without any additional covering material. The paint used was a quart of AeroGloss Cub Orange, mixing Insignia Red to a point where the paint becomes an orange with a very mild leaning toward the red side. **Mix all paint at once!** Thin slightly so that the paint flows easily. Five coats of color were used, sanding after the first three coats and working control surfaces free after each coat had dried. The final two coats were thinned out and no sanding was employed.

You are now ready for painting the trim. Mask very carefully, for you are working with three different colors — red-orange, dark blue, and white. After this is completed, give the entire ship a coat of clear dope. The latter adds lustre as well as preserving the color from hot fuels.

Paint the cabane outer wing struts with Silvair Aluminum. Main gear wheel wells and shocks are also painted with this color. You are now ready to mount the engine, radio gear, and servos. Add the auto body repair lead weight until the ship balances about 1 degree nose heavy with the balance point at 50% of the chord of the top wing. Six degrees of down thrust and three degrees of right thrust were used on the motor. I swing a 12/5 Top Flite prop on the Merco 61 for pulling power as well as realistic flight.

### Flying

Trim the tail wheel slightly left with the rudder neutral so that it will com-

pensate for the slight pull to the right developed by engine torque. Don't be afraid of power on the takeoff — the Grumman needs a 59 or 61 to take off in 50 feet. Once the ship is airborne and at a safe altitude, you will back off to about half throttle to cruise, and three quarters throttle and up for aerobatics. Inverted flight is a dream because the engine down thrust tends to keep the nose from dropping while in the inverted flight position.

Landing should be with a little down trim. It's hard to stall out this plane and the descent is like the elevator when dead stick if too much up-trim is used. I tried this up trim procedure on a few landings to find out how little

space I could use up on landing. If you try it, the Grumman will amaze you, for she's actually stalled out without being in a nose-high attitude, but she will not flare out with this trim setting. The elevator can be in the full-up position but no flare — it will just come down in that up-trim position. Horizontal control will always be with you. I haven't tried it yet, but I'll bet that if someone was holding the tail and the engine was wide open with right aileron applied, this baby would give you a right roll right on the ground!

Enough said. If you want a real sweetheart, here she is. Enjoy it like I am doing, and at the same time, have an R/C ship that has no peer.

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## PIPSQUEAK

(Continued from Page 55)

shrinking it. Clear dope the stab to match the wing, being careful to apply dope evenly to avoid warps.

The wing and landing gear dowels are installed now, gluing in place with HobbyPox glue. This will not react with the finish. The fuselage and fin should be color dope if desired — use thin dope and just enough to cover evenly. A nice shine may be obtained by brushing on several thin coats of clear dope. Yellow Japanese tissue was used on the wing and stab of the prototype with Aero Gloss metallic blue on the fuselage and fin.

After the dope is dry, the engine should be mounted in place and the landing gear bent from 1/32" aluminum. The wheels on the original model came from a "Fire-Baby" control line trainer. Use any wheels that are very light — avoid heavy rubber tired wheels. The tail wheel should have been installed earlier, before color dopping. Use a 1/2" diameter wheel and bend a strut from 1/32" wire. This should be fastened to the bottom with HobbyPox cement. The tail wheel is quite important if the model is being used for Galloping Ghost — it prevents the plane from resting on the linkage at the tail.

Speaking of linkages, let's bend up the rudder and elevator followers from .020 wire at this point. The rudder follower should be bent first. Follow the plans closely and install in the exact location shown. Rotate the torque rod 360 degrees and make sure no binding occurs at the extreme rudder position. Cement in place with a good grade of model cement. (I use Ambroid.) The elevator linkage should be bent at this point, again following the plan exactly. Solder in the cross bridge to form a slot. No wire wrapping should be necessary if good soldering techniques are used. I installed the unit on the elevator, slipping it over the end of the torque rod and punching small holes in the elevator with a straight pin for the small prongs to stick into. The elevator follower should be adjusted by gradual and slight bending to give approximately 10 degrees down elevator at neutral rudder and 40-45 degrees up at the top of the crank arc. Make sure, before cementing, that both elevators line up with each other and that everything works smoothly.

The final test, after cementing, is to hook up a 1.2V nicad cell across the motor and make sure that it will spin freely. If there are any tight spots, take the time now to free them up properly. The entire system should provide little

(Continued on page 60)





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## PIPSQUEAK

(Continued from Page 58)

or no resistance to the actuator. If an escapement is installed, the hairpin on the rudder should be positioned initially to give + or - 1/8" movement. Again, carefully check for proper operation with no binding. Use the thinnest rubber strand that will operate the escapement — this will give more turns of operation.

The receiver and batteries should be installed and wired up. Be just as neat as possible and twist all wires together into smooth cables. A little planning beforehand will make a very neat installation. The Pipsqueak prototype has the antenna strung to the top of the fin with a tiny rubber band cut from a penny balloon to provide some antenna tension. With this tiny model, most equipment will have plenty of range on this length of antenna.

### Test Flying And Trimming

The model should be carefully inspected before leaving home. Check for correct C.G. location and correct with ballast if necessary. Be sure all flying surfaces are warp-free. If you find any, use a tea kettle to steam them out. After you have assured yourself that the model is completely true, try to find a flying buddy who will double check it for you — he might spot something you had missed. If your model is the escapement version, find a patch of tall, soft grass and proceed to hand glide the model, noting its glide tendencies. If it is built true and the weight is correct, the glide should be smooth and fairly fast. If, during these initial tosses, the model veers or turns consistently in one direction, bend the torque rod to adjust the rudder in the opposite direction. When the model glides nice and straight, it is time to observe the pitch trim more carefully.

If the model is not overweight and the C.G. is definitely correct, the model should appear to want to make a swift, two-wheel landing. Do not trim the glide to get a pretty, flared landing — this will give a horrible stall under power! When satisfied with the glide, it is time to fire it up and test under power.

Before flying the model, power-on, make a thorough range check of the equipment and operate the controls with the engine running to make certain there are no vibration troubles. When satisfied, put in enough fuel to run about one minute, set the needle valve for a rich, slow run, and have a friend launch the model.

Observe the attitude of the model and try to send the minimum of signals

(Continued on Page 62)





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## PIPSQUEAK

(Continued from Page 60)

until the ship is at a safe altitude. Try to maneuver the model so that it will have enough altitude for you to closely watch the glide pattern. Any adjustments to the glide should be made by shimming the wing in small increments. Power-on flight adjustments are restricted to adjusting the down thrust of the motor.

Trimming the Galloping Ghost version of the model is very similar. After making sure there are no mis-alignments, proceed to the glide tests. Turn the equipment on and set the elevator trim so that the crank on the tail is revolving about 90 degrees to either side of center-down and set the rudder trim so that the crank action is symmetrical about neutral. Now glide the model into soft, tall grass and watch closely. Do this a number of times to make sure of the results you have obtained. If the model has a consistent turn in one direction, set the rudder trim in the opposite and glide again. When the model is gliding satisfactorily, observe the glide angle. It should be smooth with no tendency to stall or dive. If the model stalls consistently, shim the trailing edge of the wing up a little—do not change the elevator trim. If the plane is diving, shim the leading edge up a little at a time until the flight path is smooth. When the glide looks good, check the radio range and run the engine with everything pulsing. Hold the model lightly by the wingtips to avoid damping the vibration with your hands. If everything is still working, you have used up all of your excuses!

For the Galloping Ghost version of the Pipsqueak, set the engine for a fast, lean setting and put enough fuel in for about one minute. Have a buddy launch the model and try to hold the nose up slightly to climb to altitude. When the model has gained some height, gently feel out the controls—they should be responsive, so go easy at first.

The Pipsqueak is capable of precision flying and some pretty fancy maneuvers for a plane of its small size—such as excellent spins, loops, full power touch and go's, etc. The control is very precise, as evidenced by Don's photos as he, Bill Welker of Citizen-Ship, Ed Thompson, and Bill O'Brien flew the Pipsqueak from the roof of Don's house one afternoon—making each landing approach around the power and telephone poles, TV antennas, and dropping it in on a 15' x 20' area!

I hope that you have half as much fun with your Pipsqueak as we have with ours!





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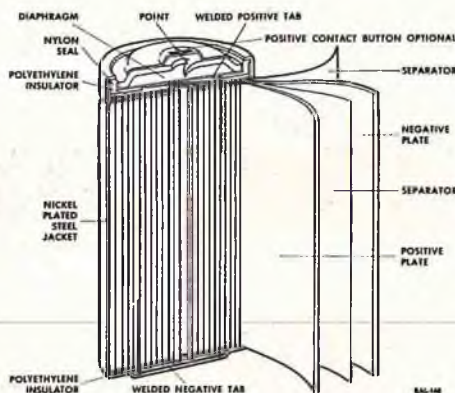
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discovered as yet. Sewing was pretty good in the past, but after some degree of longevity, the sewn hinges tended to either pull through the wood or simply rot out. Wire and tube hinges are all right if they don't cause radio interference, but they lack any way of cutting out noise. The newer nylon, and polypropylene hinges are getting their fair share of usage from most of the hip flying fraternity, but I have heard of many, many lost ailerons due to either pull-out of the hinges or ripping along the hinge line. The polypropylene hinges are the worst about tearing. The very nature of the hinge in this material makes them hard to protect from tearing. The hinge is formed by folding the plastic along a line. The molecules of the plastic are aligned parallel to the hinge line. This makes for easy folding, but also leaves no strength or resistance to shear along the hinge line. If you use them, be careful not to cut or nick the hinge at the fold line. Two excellent hinges have been found to be quite reliable over a long period of time. The first is two pieces of 1/32" or 1/16" plywood, about 1/4" wide by 1/2" to 3/4" long. Around these two hinge halves, dacron control line is tightly wrapped in a double figure eight configuration. Use white glue on the back side of the two hinge halves to hold the dacron line to the plywood. When dry, cut slots in both halves of the control surfaces, add another coat (light) of white glue to the hinge halves, and insert in the slots. Presto! Invisible hinges that work well over a long period of time. For added insurance, you can drill two holes in each half of the control surface, down through the hinges, and glue toothpicks through the surface and hinge. Yet another good hinge is the use of the new Teflon tubing, designed as a housing for brake and throttle cable. Low temperature heat shrink tubing can be obtained in various sizes from local radio supply stores. This tubing can be pulled over the Teflon tube, then heated until it shrinks tight to the tube. These can then be cut into sections and used as you would use tubing and wire type of hinge, but sans metallic noise. The heat shrink tubing can be glued to any surface with standard model cements or with epoxy glue, whereas the Teflon tubing itself, will not adhere well.

Landing gear mounting is another source of trouble as ships get faster, and correspondingly heavier. A wing mount type landing gear is not too bad for a ship weighing in at five and a half to six pounds, but the same type of mount trying to carry a ship at eight pounds is asking a lot from light balsa and plywood. As the speed of the ship goes up, generally so does the landing speed, and the shock load upon the landing



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gear is terrific. Pay attention to the trunions and trunion mounts in the wings and add a bit of beef here and there to help them with their main job. The same holds true for the nose gear. To expect a thin ⅛" piece of plywood to withstand the weight of a seven to eight pound ship landing on it at twenty to thirty miles per hour is to really be an optimist — or too good a pilot to care! Use a heavier firewall or add blocks to the nose to cut down the span of the firewall.

Have you ever thought about what happens back at the tail of your ship when you whip it into a violent snap roll or a full aileron roll? Just take a

look at the fuselage structure just ahead of the place where the horizontal stabilizer is fastened to it. Grab the stab with one hand and the body with the other. Twist it. What happens? Twist it again. No, no! Not that hard! Just a little. Notice the strain lines along the sides of the body and how the fuselage starts to buckle just ahead of the stab mount. If you don't have a good internal structure at this point, or if the balsa is weak, watch out! You could twist the tail right off that tiger in flight! If you think about this during construction of the fuselage, you can add another brace at the sides, a diagonal piece of hard ⅛" or ⅜" spar stock at

an angle to the twist lines.

If the rudder is made from too soft a material, it may flex in flight, giving you first an unwanted right turn and then a left, all due to this unseen twisting. A rudder made from too hard balsa will be a target for warps, so this is not the answer. Cross grain the wood in the rudder structure and this will be the best solution. Don't let all of the wood run in one direction; rather, blend in at least two grain lines, and possibly three.

All of the foregoing is not to say that you must at least add an extra ton of beef simply to help out an extra pound

(Continued on Page 66)



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## CUUNNINGHAM ON R/C

(Continued from Page 65)

of weight or twenty percent larger engine, but a little extra in the right place will pay off in a longer lived airplane, and one that won't end its life as a be-draggled bunch of small bits of balsa.

Just think how much easier this business was when all we had to worry about was if the engine would start and if the single channel escapement rig would work okay this time around. Models have made great strides ahead in the past four or five years, and it is no doubt that in the next few years we will see engines of a size to make our present largest seem like an .020. Also, we will see multi type radio gear shrunk in size to give us full-house capabilities in parking lot models. But . . . if you want to keep your present ship just a little longer, then **think** about the loads you are putting on it and beef it up accordingly.

## AIR MAIL

(Continued from Page 12)

home-made Orbit ten channel receiver and two Bonner Transmite servos. Power is supplied by five 225 Ma nickel cadmium cells and a thirty volt dry cell. The airplane weight is 26 ounces and has a wing loading of approximately 18 oz./sq. ft. which is about all the engine can handle. The airplane itself has the original kit dimensions, however the wing has been built with a spruce spar and one-sixteenth planked leading and trailing edges. This is necessary due to the higher wing loading.

I have just installed an O.S. Max .10 engine and another servo for the throttle, but the weather has not been good and I have not been able to test the airplane with this combination. I hope that other readers will be prompted to try a small airplane, such as mine, because this size is very economical to fly as well as to build.

Mark Yelich  
Milwaukee, Wisconsin

## R/C Hawk . . . ?

Sir:

I am enclosing a clipping from the December issue of Canadian Wings (a publication devoted to full-scale flying in Canada) which I feel might interest some of the fraternity:

"Vancouver Airport may use a mechanical hawk to keep gulls from the runways. Previously used in New Zealand, the radio controlled hawk which flies 40 MPH and makes realistic swoops on flocks of seabirds, has been successful in scaring away bird colonies. The Department of Transport will be asked to find out if the invention can be used at the coastal airport at a reasonable cost."

Just the thought of using their acres of runways brings tears to my eyes with-



out the least thought of turning pro and getting paid for it!

Built your Royal Coachman but thought I knew more and sunk a .29 in the nose. Only Sandy Koufax could hand-launch this one! Looking forward to the coming season with the presently installed conservative .09!

W. G. MacSwain  
Ottawa, Canada

A .29 powered Coachman will be good practice. For flying the hawk, that is . . .!

#### A Pome

Sir: Thoughts Upon Rising Early While Wondering If I can Fly Today (To be sung to the tune of 'Oh, What A Beautiful Morning.')

Oh, What a beautiful morning!

Oh, What a beautiful day!

I've got a beautiful feeling

I might just fly R/C today.

There's a light golden haze on my meadow,

Look again, you can't quite see the meadow . . .

If out there I jog while I'm launching that dog,

I'll bet it would vanish right into that fog!!

Ah, what a miserable morning!

Yick, what horrible gray.

Put that plane back in the closet,

I'll just sit here sulking all day. . . .

Loren Dietrich  
Aviation Department  
Reedley College  
Reedley, California

Any guy who has a dog smart enough to write an article shouldn't have to worry about the weather . . . (see Tee Dee Bee, March RMC)

## SHOWCASE '66

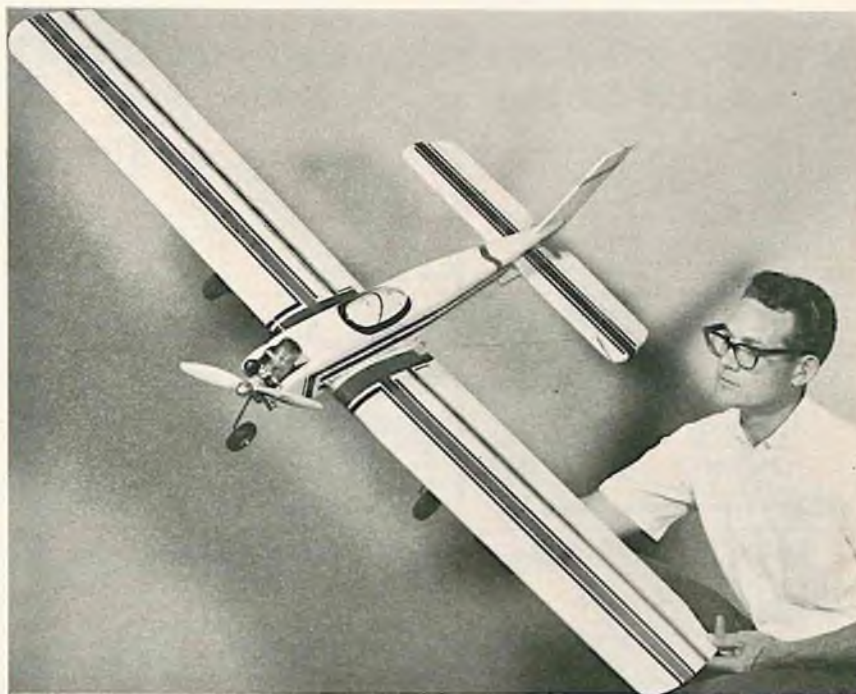
(Continued from Page 8)

on 1/16" music wire and requires no soldering or bending at the servo linkage. Price is 3 for 25c, 12 for 90c. Another excellent product is an adjustable control horn used to adjust amount of throw on elevator rudder and ailerons. Price is 39c each. Tested and recommended by RCM. Two additional items we have not yet tested include parts for constructing an electric fuel pump, and priced at \$1.00 with instructions. High impact styrene wheel pants for Goodyear racers are also available in Denight Special, Miss-Take, or Shoestring types at \$3.95 per pair. Ellis R/C Inc., 1098 Martinstein Avenue, Bayshore, N. Y. 11706. Circle #5 on the Reader Service Card.

**Nev-R-Leak Fuel Tanks**—Sullivan Products has released an entire line of fuel tanks—a line that has been tested at RCM and which carries our recommendation as one of the finest items of its kind we have reviewed. These new clunk tanks are available in round, oval, and cylindrical configurations in a complete range of sizes from 1 to 16 ounces. They are not only completely leak proof, but have the added advantage of being designed with out a neck, thus saving valuable space in normally cramped fuel tank compartments. Recommended by RCM. For further information, Circle #5 on the Reader Service Card.

(Continued on Page 68)

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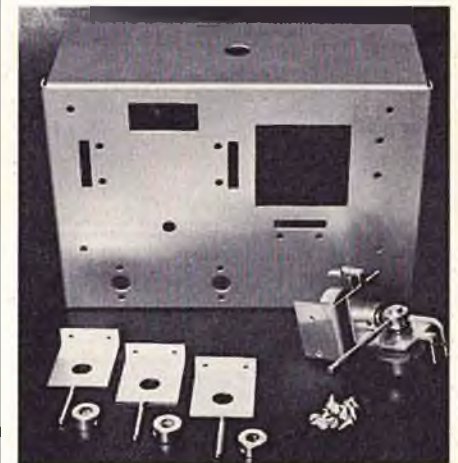
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## SHOWCASE '66

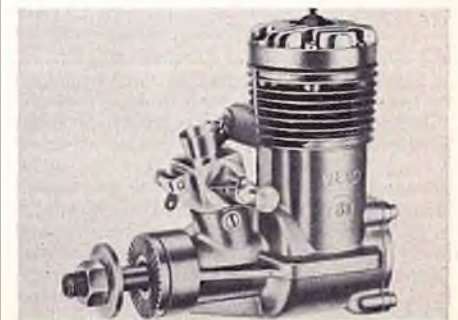
(Continued from Page 67)

**Digitrio Battery Packs** — P&D Manufacturing Co., P. O. Box 34, Chino, California, has made available complete Digitrio transmitter-receiver battery packs with dual charger, or as kits with or without batteries. The complete transmitter-receiver pack with dual charger retails at \$45.95. The kit with batteries and dual charger lists for \$38.95. Individual pack prices are \$17.95 for the receiver; \$22.95 for the transmitter; \$5.95 for the dual charger. Individual kit prices with batteries are \$14.95 for the receiver; \$18.95 for the transmitter. All batteries are Gould 600 Mah cells. Plug sets (receiver to battery) are \$1.00. Plug set for the transmitter is also \$1.00 or \$1.95 for both. P&D pays the postage. All packs are furnished with injection molded plastic cases. Dealer inquiries are welcomed. These units have been tested and are used on RCM prototypes. They are recommended by RCM. For further information, Circle #6 on the Reader Service Card.

**Digitrio Transmitter Case** — A transmitter case, complete with all stick hardware, mounting brackets, fasteners, and all trim pot hardware is available from Justin, Inc., Box 135, San Gabriel, California. The case is gray anodized and all holes are punched per RCM article instructions. Price is \$11.95 direct from the manufacturer. Tested and recommended by RCM. For further information, Circle #7 on the Reader Service Card.



**Veco .61 R/C** — The long awaited Veco .61 R/C is now in full production. Designed by Clarence Lee, the Veco 61 powered Cliff Weirick to his 1965 Nats win and Internats place. Priced at \$55.95, it is backed with a no-nonsense, lifetime guarantee against failure because of parts or workmanship. Such parts will be replaced free of charge



(Continued on Page 72)

RADIO CONTROL MODELER



## EDITOR'S MEMO

(Continued from Page 6)

part of the Department of Parks and Recreations program for public recreation.

Why? Simply because it was demonstrated to the proper authorities, and to the general public by dedicated modelers, that radio controlled model aviation is a rapidly growing sport and hobby, and that it deserves its place along with other municipal and county supported forms of recreational activity.

You, and your club, can enjoy these benefits if you will take the time and effort to present the facts, the figures, and the right educational material to the right people. If you care enough to do it, and do it the right way, you'll find that it is very likely that you'll be met with a cooperative spirit on behalf of the general public.

But they have to know what it's all about. People have always been wary of interests and activities they didn't understand — interests and activities foreign from their own. If the guy across the street practiced pistol shooting in his house, you might want to complain to him, or the police. If, on the other hand, he showed you that he used small calibre handguns, fired in a concrete windowless basement, with no chance of stray lead hitting members of your family, you'd probably be much more cooperative. You might even be interested in participating.

Think about it.

And that's about it for this month. Except that several people have mentioned that we were referred to by some obscure columnist in another publication as the "West Coast girly magazine." Probably the same guy that sent me a Fink University T-shirt for Christmas. Sorry we missed that line, Willie, but the ink had run in the pulp fibres it was printed on and we couldn't make it out. . . .

Memo to Walt Schoonard and the other Floridian RC'ers: If you ever send those 50 MPH winds out here again, we'll tell the whole world where Florida oranges really come from!

I thank you for buying this copy of RCM.

My Number One Wife thanks you.

My son thanks you.

My girlfriend thanks you.

It's a worthy cause . . .

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## 0

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The date for the 17th Annual Regatta has tentatively been set for the third weekend in August, which is Aug. 20, and 21. Final word on this next month.

For the Office of Director, Mr. William E. LeFeber has been re-elected to

Cy Crites — Alamogordo, N. M.



John Zwack — Richland, Michigan  
Frenchy LaJeunesse — Concord,  
Calif.

Ed Kalfus — Poughkeepsie, N. J.  
Bill LeFeber — Indianapolis, Ind.

#### Contest Calendar

2/26 Argonauts: Record trials; San Francisco ¼ mil. & St.

1/16, 4/30 & 5/1 Blue Dolphins; Los Angeles ¼ & ½ record trials.

5/22 DeVry Dolphins, Wheeling, Ill. (Chicago) Multi-Boat

9/18 DeVry Dolphins, Wheeling, Ill. (Chicago) Multi-Boat

5/14, 6/11, 8/13, 9/10 DeVry, Wheeling, Ill. ¼ & St. ½ Record Trials.

Just a quick reminder, get your sanction requests in **Yesterday**. Requests must be in the IMPBA office not later than the first of the month, 3 months ahead of your regatta, in order to have the date appear on the contest calendar before the meet has taken place. The best idea is to figure on getting your request in 4 or 5 months before the meet. This gives others a little time to prepare for your contest.

As a direct result of the first meeting of the multi-boat racers around the greater Chicago area, the problem of permitting all participants at a contest to compete with each other, on even terms, may have come to an end. The answer is a simple handicap formula, which permits the mixing of boats from different engine classes in a single race. In multiple boat racing, this can be a problem, since all the thrills and excitement come from racing 4 or 5 boats at one time. By using this simple system, you can have a 5 boat race, if only 5 boats are entered, all in different classes!! All you need is the published list of IMPBA records, and one more man with a stop watch. It works like this: **Your** handicap is the difference in time of the world record, be-

tween your class and your opponent's class. All boats of the same class have the same handicap. You simply take the difference in the record times, and let the slower boat go first, by the amount of the handicap, times half the number of laps in the race. ('cause the record is for 2 laps, that's why)

For example, suppose that there is to be a race between 4 boats in "F"-2 class, and one boat in the "C"-3 class. The Oval F-2 record is 0:33.8; the C-3 record is 0:49.1. The difference is 0:15.3 (total difference for **two** laps) Multiply this by half the number of laps and you have the amount of time of a head start of the slower boat. In a four lap race, this would be 30.6 seconds. This amount of handicap applies **all** year, even though the records may change. The one official sheet, which appeared in the March R/C Modeler is the only one to be used for the '66 season, until a new complete list is published for '67. This way you won't have to constantly revise the list throughout the season. Once the difference in classes is figured, it need not be done again for the whole year. The only variable is the number of laps to a race. Just multiply the difference in the two lap record time, by half the number of laps in the race. In a four lap race of three C-3 boats, and two F-2 boats, all the C-3 boats would be let go 30.6 seconds before both of the F-2 boats. The first boat to finish four laps is the winner.

We have tried handicap racing in the Midwest, to the delight of all the contestants. This simple system assures exciting heats, which can be set up for maximum number of boats in a single heat, with minimum effort and figuring on the part of the judges.

Next month, a system of scoring — just like the "big ones."

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